

*SAXIFRAGA* OF THE  
HIMALAYA  
II. SOME NEW SPECIES

HARRY SMITH

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(Uppsala)

*Pp. 227-260 ; 17 Text-figures ; Plates 13-21*

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# SAXIFRAGA OF THE HIMALAYA

## II. SOME NEW SPECIES

By HARRY SMITH

IN the first of these papers<sup>1</sup> an account was given of the Himalayan species of *Saxifraga* sect. *Kabschia*, a group so well represented in the Himalaya that the description of more than 30 new species was involved. The present paper adds 27 new species of *Saxifraga* belonging to other sections of the genus but mostly to Sect. *Hirculus*. Four of the new species are from the extreme north of Burma to the east of the main Himalaya; the others are from the region of the eastern Himalaya including Nepal, Sikkim, Bhutan and south-eastern Tibet. Varieties of three other species are also described. Unless otherwise indicated, the specimens cited are in the herbarium of the Department of Botany, British Museum (Natural History), and my sincere thanks are due to the Keeper of Botany for the loan of this rich material obtained on recent expeditions to the Himalaya and adjoining regions.

Sect. MICRANTHES (Haw.) D. Don (Sect. *Boraphila* Engler)

GREX MELANOCENTRAE Engler & Irmscher

***Saxifraga rubriflora*** H. Sm., sp. nov. (Plate 13 A.)

Planta ex affinitate *S. gageanae* W. W. Sm. et eae flore persimilis, foliis autem valde diversa. Rosulae humiles aggregatae; flores rubri, breviter pedicellati, pro rosula singuli.

*Folia* rosularia dense conferta, crassiuscula, late obcuneata, c. 7 mm. longa et lata, parte apicali rotundato-truncata crenulato-dentata, parte inferiore integra cuneatim angustata vix petiolata, supra in margine et interdum etiam subtus pilis longis subglanduliferis obsita. *Flores* solitarii, 2-7 mm. longe pedicellati, pedicello rubro crispulo-piloso. *Hypanthium* late obconicum, 1.5 mm. altum. *Sepala* rubescentia, ovata, obtusa, 2.5 mm. longa, 1.5 mm. lata, glabra, nervis 3, lateralibus saepe ramosis in apicem confluentibus. *Petala* rubra, ovato-elliptica, brevissime unguiculata, obtusa, 2.5 mm. longa, 1.5 mm. lata, obscure 3-nervia. *Stamina* 1.5 mm. longa, antherae thecis subrotundatis 0.3 mm. longis. *Ovarium* crassum, ovoideo-conicum, 2 mm. altum, 3 mm. latum, stigmatibus subapplanatis fere sessilibus. *Capsula* adhuc non visa.

BHUTAN: Omta Tso, 4,650 m.; on earthy hill slopes; calyx and corolla portwine red; filaments red, anthers dark brown; ovaries red; 11 Aug. 1949, *Ludlow, Sherriff & Hicks* 17099 (holotype in Herb. Brit. Mus.).

<sup>1</sup> Bull. Brit. Mus. (Nat. Hist.), Bot. ii: 83-129 (1958).



## Sect. HIRCULUS (Haw.) Tausch

Grex CINCTAE H. Sm.<sup>1</sup>**Saxifraga excellens** H. Sm., sp. nov. (Fig. 1; Plate 13 B.)

Planta mirabilis cum nulla alia specie *Saxifragae* bene comparanda. Caules floriferi e rhizomate compacto solitarii vel plures; folia basalia vulgo desunt, folia caulina 3–8, permagna, subtus rubra; flores rubri vel rubescentes, 0.8–1.4 cm. longi, in ramis axillaribus et in apice subumbellatim dispositi.

*Caulis* infima parte glabrescens, medio laxa, sursum densius pilosus, pilis longis crispulis rubescentibus eglandulosis vel in pedicellis glandula perminuta instructis. *Folia* basalia (si interdum adsint ut in *S.*, *S. & W.* 4384, *Dhwoj* 166) caulinis infimis

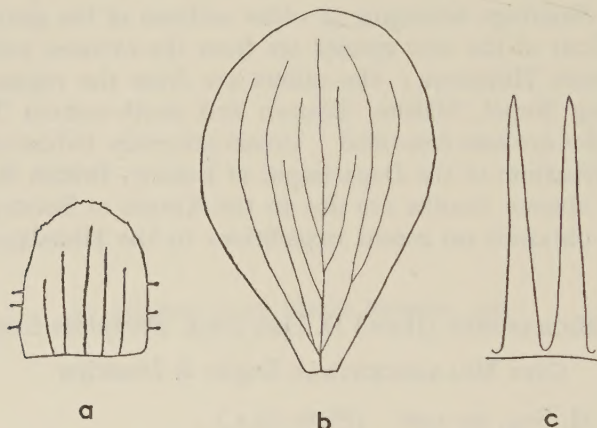


FIG. 1. *Saxifraga excellens* H. Sm. (holotype); a, sepal; b, petal; c, filaments. (All  $\times 5$ .)

similia sed minora; folia caulina infima 1–3, 1–7 cm. longe petiolata, lamina obovato-elliptica ad 9.5 cm. longa et 5.3 cm. lata; folia caulina media et superiora 2–6, amplectenter sessilia, late elliptica, ad 7 cm. longa et 5 cm. lata, supremis in bracteas foliaceas decrescentibus; folia omnia in margine et subtus in nervis atque in petiolo pilis longis crispulis rubescentibus instructa. *Hypanthium* latum, pilis tenuibus minute glanduliferis vel eglandulosis sparsissime obsitum. *Sepala* late ovata, obtusa, 4.5 mm. longa, 3.5 mm. lata, dorso glabra, margine basin versus parce glanduloso-pilosa vel glabrescentia, apice interdum minutissime laciniata, nervis 5 liberis rectis. *Petala* rubra vel rubescentia, obovata, ad basin sensim angustata, ad 9 mm. longa et 6 mm. lata, ecallosa, nervis 5–7. *Stamina* c. 6 mm. longa; filamenta subulata deorsum applanata et basi inter se connata; antherarum thecae rubrae, 1 mm. longae. *Ovarium* superum, ovoideum, fere 5 mm. altum et crassum, stylis robustis vix 1.5 mm. longis, stigmatibus applanatis robustis.

NEPAL: Annapurna Himal, Mardi Khola, 3,750 m.; under overhanging boulders; stem and underside of leaves red; flowers red; 18 Sept. 1954, *Stainton, Sykes &*

<sup>1</sup> Grex nov., staminum filamentis basi connatis annulum angustum formantibus distinctus.

*Williams 8460* (holotype in Herb. Brit. Mus.). Annapurna Himal, Seti Khola, 4,200 m., 2 Aug. 1954, *Stainton, Sykes & Williams 6596*. Same locality, 4,050 m., 14 Sept. 1954, *Stainton, Sykes & Williams 8615*. Above Sauwala Khola, 3,750 m., 13 Sept. 1954, *Stainton, Sykes & Williams 4384*. Tapchat, 3,900–4,200 m., 1928, *Lall Dhwoj 166*. Foketey, 3,600–4,200 m., 1930, *Lall Dhwoj 0528*.

This remarkable species has an appearance unlike that of any other *Saxifraga*. The characteristic of having the filaments united at the base has not previously been recorded for the genus, but in other respects the flowers conform to the pattern of Sect. *Hirculus*. I therefore place the species in that section (though with some hesitation) and treat it as the type of a distinct grex.

Grex HIRCULOIDEAE Engler & Irmscher (incl. Grex *Turfosae* Engler & Irmscher, *Stellariifoliae* Engler & Irmscher, *Densifoliae* Engler & Irmscher)

***Saxifraga implicans* H. Sm., sp. nov.** (Fig. 2 a–c; Plate 14 A.)

Planta cum *S. diversifolia* Wall. ex Ser. sensu latissimo apud Engler et Irmscher in Engler, Pflanzenr. IV. 117:127 (1916) confusa. Habitu *S. parnassifoliae* D. Don persimilis sed distat inter alia sepalorum nervis liberis (nec confluentibus), petalis ecallosis (nec elevato-callosis), ovario fere supero (nec semi-infero).

*Caulis* erectus saepe subflexuosus, 20–50 cm. altus, 10–16-foliatus, inferiore parte modice ferrugineo-pilosus dein glabrescens, superne in ramis floriferis et in pedicellis dense breviter glanduloso-pilosa, pilis paullo inaequalibus 0.1–0.4 mm. longis. *Folia* rosularia vulgo deficientia, si adsint eis caulinibus infimis conformia et subaequimagna; folia caulina infima ad 4 cm. longe petiolata, lamina cordato-ovata c. 2.5 cm. longa et 1.5 cm. lata, petiolis sursum decrescentibus; folia caulina media et superiora stricte sessilia, gradatim minora et ovata sed sub inflorescentiam lanceolata; infima subtus et in margine parce longepilosa supra glabra, media glabra vel glabrescentia, superiora in margine (suprema etiam supra) dense breviglandulosa. *Flores* ad 12 in ramis 4–5 prolongatis et 1–3-floribus subfastigiatis dispositi. *Sepala* longiuscule ovata, in anthesi reflexa, 4 mm. longa, 1.7 mm. lata, superiore parte membranaceo-marginata, dorso margineque glanduloso-pilosa, nervis 3 liberis. *Petala* lutea, intus minute aurantiaco-maculata, ovato-elliptica, in unguem 0.8 mm. longum abrupte contracta, ad 8 mm. longa et 4 mm. lata, ecallosa, 3-nervia. *Stamina* petalis parum breviora. *Ovarium* fere superum, ovoideum, stylis erectis c. 1 mm. longis.

S.E. TIBET: Zimsati, near Sanga Chöling, 4,200 m., 14 Aug. 1936, *Ludlow & Sherriff 2061*. Kongbo, Pangkar, Drukla Chu, 3,450 m., 21 Aug. 1938, *Ludlow, Sherriff & Taylor 6875*. Kongbo, Doré, Nye Chu, 3,900 m., 6 Aug. 1947, *Ludlow, Sherriff & Elliot 15570*. Kongbo, Nyoto Sama, 3,900 m.; in open forest among rocks; calyx green; corolla deep yellow; filaments and anthers yellow; 10 Aug. 1947, *Ludlow, Sherriff & Elliot 15582* (holotype in Herb. Brit. Mus.). Shugden Gompa, Nagong River, 3,600–3,900 m., 26 Aug. 1933, *Kingdon-Ward 10791*. Tsarong, upper Salween River, northern slopes of Mt. Kenichunpo, north of Sikitung, 3,750 m., May–June 1932, *Rock 22144*.



CHINA: N.W. Yunnan, Doker La, 3,300–3,600 m., Aug. 1913, *Kingdon-Ward 1042* (Herb. Edinburgh). Same locality, 4,500 m. (?), 20 Oct. 1913, *Kingdon-Ward 1135* (Herb. Edinburgh).

The plant deserves an epithet derived from *implicare* (to entangle), for it is probably this species that has brought about so much misunderstanding of the *S. diversifolia* group. It unites the appearance of *S. parnassifolia* D. Don (Fig. 2 *d–g*) with several

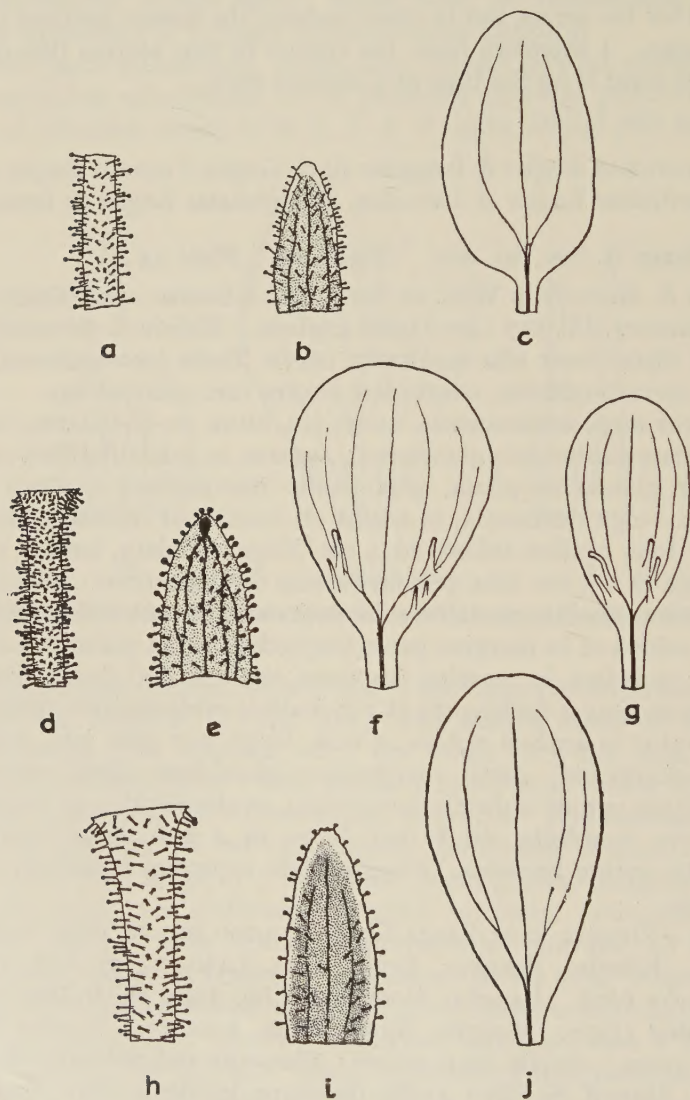


FIG. 2. *Saxifraga implicans* H. Sm. (holotype): *a*, pedicel; *b*, sepal; *c*, petal. *S. parnassifolia* D. Don (Lall Dhwoj 0260, except *g*): *d*, pedicel; *e*, sepal; *f*, petal; *g*, petal (type coll.). *S. diversifolia* Wall. ex Ser. (Ludlow, Sherriff & Taylor 6639): *h*, pedicel; *i*, sepal; *j*, petal. (All  $\times 5$ .)



characteristics belonging to *S. diversifolia* Wall. ex Ser. (Fig. 2 *h-j*) and related species.

***Saxifraga tigrina* H. Sm., sp. nov.** (Fig. 3 *a-c*; Plate 14 B.)

Perennis, solitaria, habitu *S. pardanthinae* Hand.-Mazz. (Fig. 3 *f-h*) similis, sed distat inter alia petalorum forma.

*Caulis* florifer 12–34 cm. altus, inferiore parte pilis longis ferrugineis instructus, superne et in inflorescentia breviter (0.3 mm.) nigro-glanduloso-pilosus, corymboso-paniculate 4–30-florus. *Folia* rosularia 4–8 ut caulina infima longipetiolata, subtus et in margine longe seriato-ciliata, lamina c. 4 cm. longa et 3 cm. lata ovata ad elliptica basi in petiolum latum lamina sublongiorem cuneatim vel truncatim contracta; folia caulina 4–8, sursum decrescentia et in bracteas inflorescentiae transeuntia, a medio caulis sessilia, elliptica vel lanceolata, margine seriato-ciliata; bracteae supremae sparse glanduloso-pilosa. *Calyx* fere ad basin partitus; sepala ovata, in anthesi reflexa, ad 3 mm. longa et fere 2 mm. lata, utrinque glabra, margine membranacea glanduloso-pilosa, nervis 3 liberis parallelis. *Petala* lutea, inferiore parte maculis brunneo-rubris transverse striata, elliptica, in unguem angustum 2 mm. longum contracta, ad 10 mm. longa et 4.5 mm. lata, lamina deorsum callis elevatis 3–5 instructa. *Stamina* petalis  $\frac{1}{3}$  breviora, antherae thecis rubris. *Ovarium* globoso-ovoideum, stigmatibus fere sessilibus. *Capsula* matura adhuc non visa.

S.E. TIBET: Kongbo, Yumbu, 3,000 m.; on rocks; calyx green; corolla bright yellow with maroon markings at base of petals; 28 Sept. 1947, Ludlow, Sherriff & Elliot 15805 (holotype in Herb. Brit. Mus.).

***Saxifraga calopetala* H. Sm., sp. nov.** (Fig. 3 *d, e*; Plate 15 A.)

Planta ad 36 cm. alta, habitu *S. subaequifoliatae* Irmscher (Fig. 3 *i-k*) et flore *S. tigrinae* H. Sm. similis; ab hac distat foliis infimis in petiolum cuneatim (nec cordatim) contractis, petalis graciliter 2 mm. longe unguiculatis inferiore dimidia parte brunneo-rubro-punctulatis (nec ungue robusto 0.5 mm. longo et petalis in toto punctulatis); ab illa, foliis caulinis numerosioribus majoribus, supremis pilis glanduliferis dense obsitis, sepalis fere duplo majoribus dorso margineque longe glanduloso-pilosis, ovario minore.

*Caules* floriferi solitarii (?), infima parte longe et dense ferrugineo-pilosi, superne et in ramis floriferis et in pedicellis copiose glanduloso-pilosi; inflorescentia 9–14-flora, elongato-cymosa. *Folia* basalia longipetiolata, emarcida; folia caulina 8–13, omnia apice acuta vel subacuta, infima 6–8 cm. longa, lamina lanceolata 2–3 cm. lata in petiolum ad 3 cm. longum sensim angustata, margine et petiolo ferrugineo-pilosa, ceterum glabrescentia; media breviter petiolata vel subsessilia, lamina ad 4.5 cm. longa et 2.8 cm. lata in basin cuneatim angustata; superiora sessilia, ovato-elliptica, decrescentia et in bracteas lanceolatas transeuntia; folia media supra sparse, suprema dense ferrugineo-pilosa, bracteis etiam pilis longis glanduliferis obsitis. *Hypanthium* glanduloso-pilosum. *Sepala* lineari-ovata, ad 5 mm. longa et 2 mm. lata, dorso margineque longe glanduloso-pilosa, nervis 3 vulgo sub apice in verruculam confluentibus. *Petala* aurantiaca, infima dimidia parte

brunneo-rubro-punctulata, elliptica, in unguem gracilem 2 mm. longum contracta, c. 8 mm. longa et 4 mm. lata. *Stamina* petalis  $\frac{1}{4}$  breviora, antherae thecis rubris. *Ovarium* superum, anguste ovoideum, statu submaturo 4 mm. longum et 2.5 mm. crassum, stylis aetate divaricantibus vix 1 mm. longis.

BURMA: Nam Tamai valley (Adung Wang-Gamlang Wang), 28° 15' N., 97° 30' E., 3,000-3,300 m.; in open places; whole plant hairy with long cottony hairs, shorter

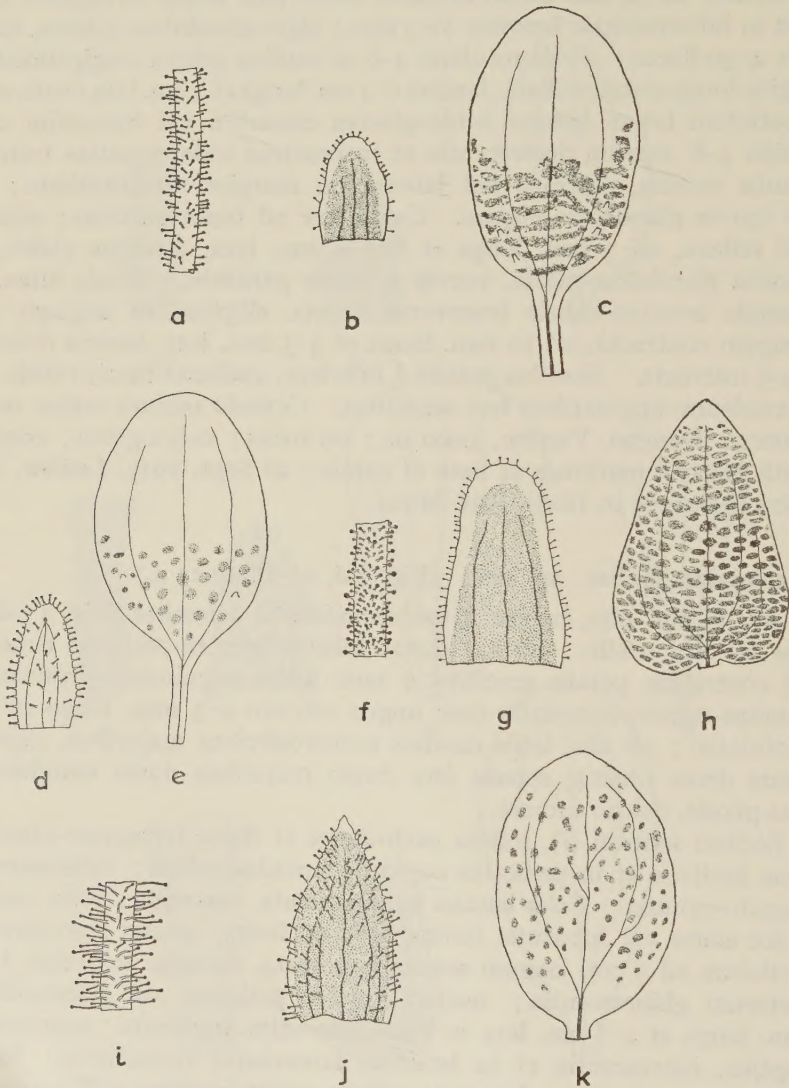


FIG. 3. *Saxifraga tigrina* H. Sm. (holotype): a, pedicel; b, sepal; c, petal. *S. calopetala* H. Sm. (holotype): d, sepal; e, petal. *S. pardanthina* Hand.-Mazz. (Kingdon-Ward 4904, paratype coll. of *S. atrosanguinea* Anthony): f, pedicel; g, sepal; h, petal. *S. subaequifoliata* Irmischer (holotype): i, pedicel; j, sepal; k, petal. (All  $\times 5$ .)



and gland-tipped on the inflorescence-pedicels, bracts and calyx; flowers orange with a disk of small maroon spots in the centre; 30 Sept. 1937, *Kingdon-Ward 13321* (holotype in Herb. Brit. Mus.).

***Saxifraga sphaeradena* H. Sm., sp. nov.**

Planta verisimiliter ex affinitate *S. subamplexicaulis* Engler & Irmscher. Perennis; caules erecti, solitarii vel plures conferti, 6–15 cm. alti, uniflori; flores subdioici, lutei, 18–23 mm. diam.

Subsp. ***sphaeradena***. (Fig. 4 *a-d*; Plate 15 B.)

*Caules* solitarii vel 2–3 conferti, 12–15 cm. alti, 6–8-foliati, deorsum glabri, suprema parte sub florem glandulis robustis rubro-nigris sessilibus vel interdum perbreviter stipitatis ornati. *Folia* omnia glabra; folia rosularia tenuiter 2–3 cm. longe petiolata, lamina triangulari-ovata patenter curvata 10–12 mm. longa et c. 7 mm. lata; folia caulina sursum decrescentia, infima 2–3 breviter petiolata longiuscule triangularia ad 15 mm. longa et 5 mm. lata, superiora fere recte patentia stricte sessilia basi lata caulem amplectantia, suprema 6 mm. longa. *Sepala* late ovata, 4 mm. longa, 3 mm. lata, glabra, nervis 3 in apicem confluentibus. *Petala* lutea, aurantiaco-maculata, rotundato-elliptica, vix unguiculata, 8–10 mm. longa, 5.5–7 mm. lata, ecallosa, 5-nervia. *Stamina* in flore submasculo petalis duplo breviora, antherae thecis luteis subglobosis c. 0.7 mm. longis pollen producentibus. *Ovarium* in flore submasculo verisimiliter abortivum, globosum, c. 4 mm. altum, stylis minutis, stigmatibus imperfectis.

NEPAL: Ganesh Himal, Shiar Khola, 3,750 m., 15 July 1953, *Gardner 1311*. Same locality, 4,050 m., 15 July 1953, *Gardner 1340*. Langtang valley, c. 4,950 m., June 1949, *Polunin 637*. Central Nepal, without precise locality, 4,800 m., 1949, *Tilman* for *Polunin 1691*. Arun-Tamur watershed, south of Topke Gola, 4,200 m., 8 July 1956, *Stainton 884*. Tamur valley, Mewa Khola, Topke Gola, 4,050 m., 12 July 1956, *Stainton 956*.

SIKKIM: Lampokri, 4,200 m., 12 Aug. 1913, *Rohmoo Lepcha 890* (Herb. Edinburgh).

S.E. TIBET: Lukuthang, Mago, 4,050 m.; in masses on rocks and also on stony hill slopes; colour yellow; 3 Aug. 1934, *Ludlow & Sherriff 807* (holotype in Herb. Brit. Mus.).

I have chosen *Ludlow & Sherriff 807* as type. This good and well-preserved material will give a better representation of the species than the rather poor *Rohmoo Lepcha 890*, though there also two subfemale individuals are present. On these the following description is based:

Planta (*Rohmoo Lepcha 890*) subfeminea etiam si habitu minor tamen typo conformis. *Stamina* c. 3 mm. longa, antherae thecis minutis polline carentibus. *Ovarium* crassum, ovoideo-globosum, stylis robustis divaricatis 1 mm. longis, stigmatibus applanatis.

*Polunin 637* (submale) and *1691* (subfemale) are slightly divergent from the type. The leaves are more narrow, the petals bicallose and the anthers reddish-brown. They might represent a variety of their own.

Subsp. **dhwojii** H. Sm., subsp. nov. (Fig. 4 e-h.)

*Planta* (submascula solum visa) densiuscule caespitosa ; caules plures, 6-8 cm. alti, 3-5-foliati, infima parte glabri vel sparsissime rufo-pilosi, sursum sat dense

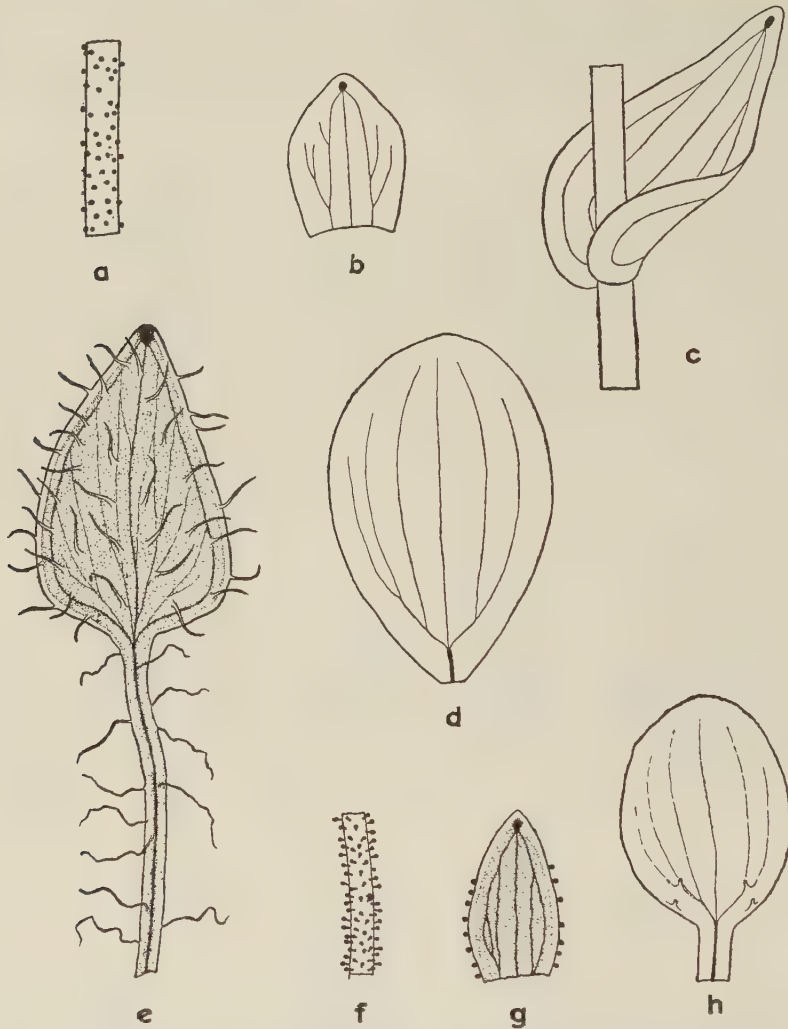


FIG. 4. *Saxifraga sphaeradena* H. Sm. subsp. *sphaeradena* (holotype) : a, pedicel ; b, sepal ; c, cauline leaf, n. 3 from top ; d, petal. *S. sphaeradena* subsp. *dhwojii* H. Sm. (holotype) : e, rosular leaf ; f, pedicel ; g, sepal ; h, petal. (All  $\times 5$ .)

glanduloso-pilosi, glandulis nigris inaequimagnis media parte caulis breviter stipitatis, superne partim subsessilibus. *Folia* rosularia et saepe caulina infima margine et in pagina superiore robuste albo-ciliata ; folia caulina suprema glabra vel margine glandulis sessilibus ornata. *Sepala* elongate triangulari-ovata, obtusa vel acuta et



saepe recurvantia, 4 mm. longa, 2 mm. lata, margine parce sessili-glandulosa. *Petala* lutea, in unguem distinctum 1 mm. vel ultra longum contracta, elevatim 2- vel 4-callosa.

NEPAL: Jata Pokhni, 4,200–4,500 m.; flowers yellow; 1930, *Lall Dhwoj* 0625 (holotype in Herb. Brit. Mus.).

*SAXIFRAGA MONTANA* H. Sm. in Act. Hort. Gothoburg. i: 9, fig. 2 *e-l*, t. 6 (1924).

Forma **rubra** H. Sm., forma nov.

Flores paullo minores, petalis rubris 6–8 mm. longis. Ceterum a typo speciei non diversa.

NEPAL: Namdo, north of Mustang, 4,950 m.; on wet boggy grassland; calyx, corolla and filaments red, anthers yellow; 9 Aug. 1954, *Stainton, Sykes & Williams* 2336 (holotype in Herb. Brit. Mus.).

*Saxifraga namdoensis* H. Sm., sp. nov. (Fig. 5; Plate 16 A.)

Species ex affinitate *S. congestiflorae* Engler & Irmscher, habitu *S. hookeri* Engler & Irmscher subsimilis; ab hac distat planta non caespitosa, foliis caulinis paucioribus sursum decrescentibus, sepalorum nervis sub apice confluentibus, stylis 0.5 mm.

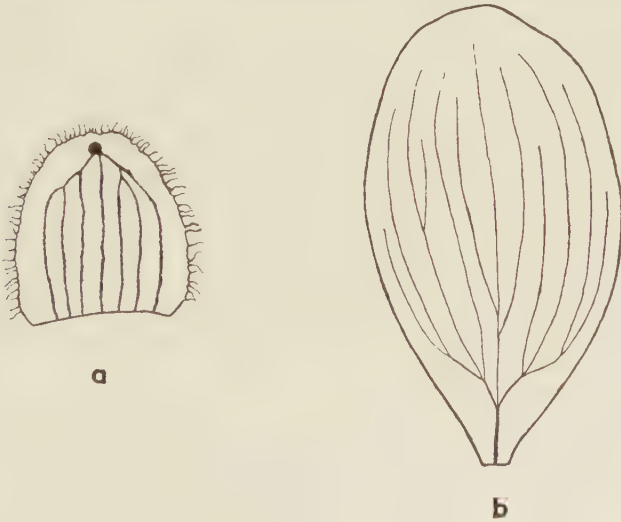


FIG. 5. *Saxifraga namdoensis* H. Sm. (holotype): *a*, sepal; *b*, petal. (Both  $\times 5$ .)

longis (nec 1.5 mm.); ab illa, planta omnino eglandulosa, praesertim in pedicellis dense ferrugineo-pilosa (nec glanduloso-pilosa), floribus fere duplo majoribus, sepalis obtusissimis margine ferrugineo-pilosis (nec acutis, glandulosis).

*Caules* floriferi solitarii vel pauci conferti, ad 25 cm. alti, superne pauciramosi flores 3–7 gerentes, infima parte glabri, sursum modice et in ramis floriferis densius

ferrugineo-pilosi, 6-8-foliati. *Folia* basalia emortua; folia caulina sursum decrescentia, margine et in axillis modice ferrugineo-pilosa, ceterum nitenter glabra, infima 1-2 ad 1 cm. longe petiolata, lamina ad 2.2 cm. longa et 0.9 cm. lata; superiora sessilia, lamina lanceolata 2.8-1.5 cm. longa et 0.9-0.4 cm. lata. *Hypanthium* glabrescens. *Sepala* late ovata, c. 4 mm. longa et 2.7-4.2 mm. lata, dorso glabra, margine crebre albo-ferrugineo-crispulo-pilosa, nervis 5-7 sub apice confluentibus. *Petala* lutea, obovato-elliptica, non unguiculata, ad 11 mm. longa et 7 mm. lata, ecallosa, nervis 9-11 ramosis. *Stamina* c. 5 mm. longa. *Ovarium* fere  $\frac{1}{3}$  inferum, subglobosum, 6.5 mm. altum, 5 mm. crassum, stylis brevissimis 0.5 mm. longis, stigmatibus robustis 1 mm. diam.

NEPAL: Namdo, north of Mustang, 4,500 m.; on grass bank of stream; stem covered with pink hairs; calyx reddish-green; petals, filaments and anthers yellow; 7 Aug. 1954, *Stainton, Sykes & Williams 2266* (holotype in Herb. Brit. Mus.).

***Saxifraga montanella* H. Sm., sp. nov.** (Fig. 6; Plate 16 B.)

Planta ex affinitate *S. montanae* H. Sm. sed multo minor, caulibusque semper unifloris. Perennis, caespites densas humiles formans, caulibus numerosis 2-5 cm. altis laxe foliatis; flores vulgo subdioici, lutei, c. 11 mm. diam.

*Caulis* tota longitudine modice sed sub florem densiuscule ferrugineo-pilosus. *Folia* rosularia ad 10 mm. longa, in margine et sparsim etiam in pagina superiore longe ferrugineo-pilosa, pilis non raro glandula brunnea perminuta instructis, lamina lanceolata ad 5 mm. longa et 1.5-2 mm. lata, apice obtusa, basi in petiolum 0.5 mm. latum sensim angustata; folia caulina 6-10, infima subpetiolata ad 10 mm. longa et 1.7 mm. lata, suprema breviora et latiora, omnia in margine longe ferrugineo-pilosa, pilis crispulis interdum minutissime capitulatis. *Hypanthium* basi ferrugineo-pilosum. *Sepala* rotundato-ovata, 3.5 mm. longa, fere 3 mm. lata, dorso glabra, margine ciliata vel glabra, nervis 3-5 liberis. *Petala* lutea, ovata vel orbicularia, in unguem ad 0.8 mm. longum abrupte contracta, 6 mm. longa, 4 mm. lata. *Stamina* in flore submasculo inaequilonga, filamento 2 vel 3.5 mm. longo, antherae thecis pollen producentibus 0.7 mm. longis et crassis; in flore subfemineo c. 3 mm. longa, thecis deminutis polline carentibus. *Ovarium* in flore submasculo cupuliforme, 3.5 mm. altum, stylis brevissimis, stigmatibus non evolutis; in flore subfemineo dimidio fissum, stylis robustis 1 mm. longis, stigmatibus robustis. *Capsula* annotina plantae submasculae semina non producens.

BHUTAN: Narim Thang, 4,050 m.; on dry cliffs; flowers golden yellow; 23 July 1949, *Ludlow, Sherriff & Hicks 21325* (holotype in Herb. Brit. Mus.). Me La, 4,200 m., 6 Aug. 1933, *Ludlow & Sherriff 423*. Me La (south side), 4,200 m., 2 Sept. 1949, *Ludlow, Sherriff & Hicks 21181*. Gaffoo La, Pho Chu-Mangde Chu watershed, 4,800 m., 15 Sept. 1949, *Ludlow, Sherriff & Hicks 17244*. Head of western branch of Pho Chu, 4,050 m., 21 June 1949, *Ludlow, Sherriff & Hicks 16608*. Tolegang, Tsampa, 4,350-4,650 m., 10 Sept. 1949, *Ludlow, Sherriff & Hicks 19720*.

S.E. TIBET: Lukuthang, Mago, 4,050 m., 3 Aug. 1934, *Ludlow & Sherriff 809*. Kongbo, Kulu Phu Chu, near Paka, 29° 15' N., 94° 25' E., 4,650 m., 27 July 1938,



Ludlow, Sherriff & Taylor 5968a. Kongbo, Mira La, Nyang Chu, Puchu, 29° 30' N., 94° 15' E., 4,500–4,800 m., 14 Aug. 1938, Ludlow, Sherriff & Taylor 6068.



FIG. 6. *Saxifraga montanella* H. Sm. (holotype, except *g, h*): *a*, rosular leaves; *b*, cauline leaf; *c*, subfemale flower; *d*, submale flower; *e*, sepal; *f*, petal; *g*, glabrous sepal (Ludlow, Sherriff & Hicks 17244); *h*, petal (same). (All  $\times 5$ .)

***Saxifraga lepida* H. Sm., sp. nov. (Plate 17 A.)**

Caespitosa, caulibus erectis gracillimis 5–8 cm. altis unifloris; flores vulgo subdioici, lutei, ad 1.3 cm. diam.

*Caulis* 4–8-foliatus, in axillis parce rufo-pilosus, pilis aetate evanidis, ceterum glaber. *Folia* rosularia 1–1.5 cm. longa, lamina lanceolato-lineari 0.6–2 mm. lata basi in petiolum subaequilongum sensim angustata, glabra vel sparse-densiuscule

ciliata; folia caulina angustissime linearia, attenuato-subsessilia, glabra vel modice ciliata, sursum decrescentia, infima ad 1 cm. longa. *Sepala* elliptica, 2.5 mm. longa, 1.6 mm. lata, initio anthesis patentia, demum reflexa, glabra, margine submembranacea, nervis 3 liberis. *Petala* lutea, intus basi aurantiaco-maculata, rotundato-obovata, brevissime unguiculata, 6 mm. longa, 4 mm. lata, 3-5-nervia. *Stamina* petalis duplo breviora, antherae thecis in flore subfemineo polline carentibus. *Ovarium* in flore submasculo parvum, conicum, stylis deminutis; in flore subfemineo ovoideum, stylis suberectis fere 0.5 mm. longis. *Capsula* matura adhuc non visa.

NEPAL: Tukucha, Kali Gandaki, 3,150 m., 22 Aug. 1954, *Stainton, Sykes & Williams* 7396. Annapurna Himal, Seti Khola, 3,750 m., 3 Aug. 1954, *Stainton, Sykes & Williams* 6613.

BHUTAN: Maruthang, 3,540 m.; in grassy ravines; calyx reflexed, green on exposed inner surface, red on outer surface; corolla yellow; 10 Aug. 1949, *Ludlow, Sherriff & Hicks* 17095 (holotype in Herb. Brit. Mus.). Pangotang, Tsampa, 3,750 m., 9 Sept. 1949, *Ludlow, Sherriff & Hicks* 19707.

The rosular leaves are variable as to the ciliation. One specimen may have some leaves glabrous and others ciliate. A whole collection can have them all perfectly glabrous (*L., S. & H.* 19707) or densely ciliate (*S., S. & W.* 6613). The ciliation of the rosular and the lower cauline leaves seems to be of no taxonomic significance.

An incompletely labelled specimen of this elegant plant in Herb. Edinburgh (numbered 174 but without locality) was recognized as a new species by W. W. Smith. The specific name noted by him on the sheet was never published, and has been used later by another author.

### ***Saxifraga lepidostolonosa* H. Sm., sp. nov. (Plate 17 B.)**

Species ex affinitate *S. lepidae* H. Sm. et eae similis, sed distat planta laxe caespitosa e basi stolones graciles emittenti, caule sursum breviter nigro-glanduloso, floribus hermaphroditis, sepalis non reflexis.

*Caulis* uniflorus, 4-7-foliatus, in axillis rufo-pilosus, deorsum glaber, sursum glandulis nigris brevistipitatis instructus; stolones tenues, repentes, ad 4 cm. longi, in axillis foliorum tenuium rufo-pilosi. *Folia* rosularia c. 1 cm. longa, basi rufo-pilosa ceterum glabra, lamina lanceolato-lineari 1 mm. vel minus lata, apice obtusa, basi in petiolum subaequilongum attenuata, pagina supra cellulis magnis convexis nitide subverruculata; folia caulina linearia, attenuato-sessilia, glabra, sursum decrescentia, infima ad 1 cm. longa, minus quam 1 mm. lata. *Sepala* ovato-elliptica, non reflexa, 2 mm. longa, 1.2 mm. lata, glabra. *Petala* lutea, obovata, obscure unguiculata, c. 4.5 mm. longa et 2-2.5 mm. lata, 3-nervia. *Stamina* petalis duplo breviora. *Ovarium* ovoideo-globosum, stylis divaricatis subrobustis 0.6 mm. longis. *Capsula* matura adhuc non visa.

BHUTAN: Jü La, Mangde Chu, 4,200 m.; in damp peaty ground; calyx reddish-brown; corolla yellow; 19 July 1949, *Ludlow, Sherriff & Hicks* 16896 (holotype in Herb. Brit. Mus.).



**Saxifraga glabricaulis** H. Sm., sp. nov. (Fig. 7; Plate 18 A.)

*Saxifraga palpebrata* sensu Sm. & Cave in Rec. Bot. Surv. Ind. iv : 192 (1911); non Hook. & Thoms.

*Saxifraga palpebrata* var. *elliptica* W. W. Sm. in Rec. Bot. Surv. Ind. iv : 368 (1913), nom. nud.

*Saxifraga palpebrata* var. *parceciliata* Engler & Irmscher in Engler, Pflanzenr. IV. 117 : 125 (1916).

Species a *S. palpebrata* Hook. & Thoms. bene distincta caulibus glabris, pilis ferrugineis deficientibus, foliis caulinis petiolatis, sepalis eciliatis, petalis unguiculatis.

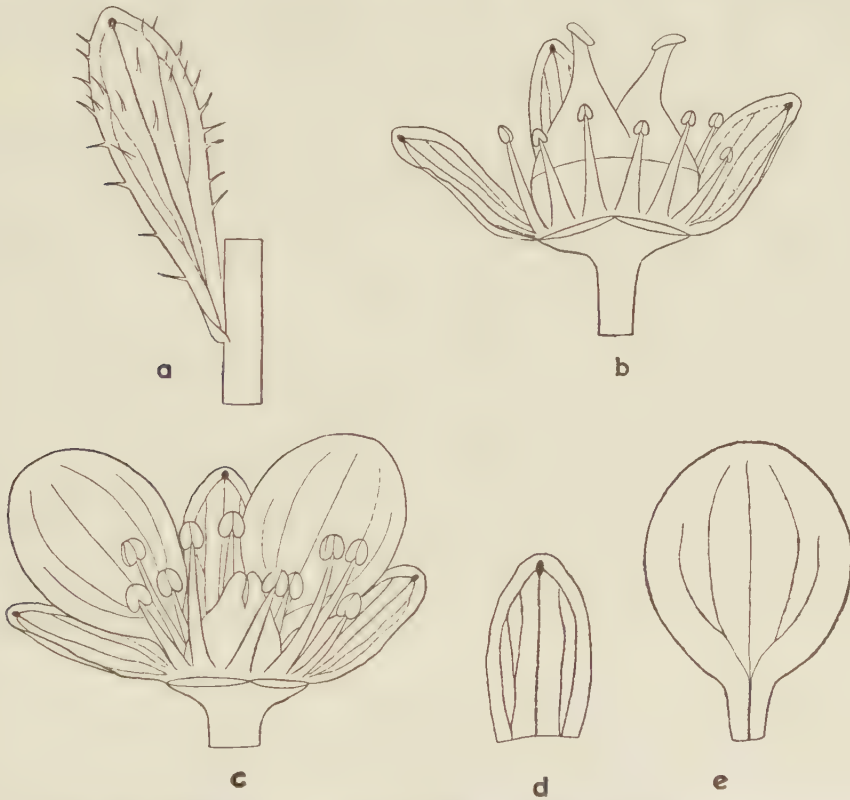


FIG. 7. *Saxifraga glabricaulis* H. Sm. (holotype): a, cauline leaf; b, subfemale flower; c, submale flower; d, sepal; e, petal. (All  $\times 5$ .)

Planta dense caespitosa, caulibus numerosis 2–4 cm. altis unifloris; flores subdioici, lutei, 10–13 mm. diam.

*Caulis* perfecte glaber, densiuscule c. 6-foliatus. *Folia* rosularia ad 2 cm. longa, lamina lanceolato-ovata 4–6 mm. longa et 1.5–3 mm. lata, apice obtusa, basi in petiolum tenuem contracta, supra et in margine robuste ciliata; folia caulina deorsum longe, sursum breviter petiolata vel interdum basi acuto subsessilia, petiolo basin versus vulgo saccato-subinflato, lamina subaequilonga late oblanceolata

6–8 mm. longa et 2–3 mm. lata, apice obtusa margine et vulgo etiam supra grosse ciliata. *Hypanthium* glabrum. *Sepala* late lanceolata, obtusa, 3–4 mm. longa, 1–3 mm. lata, glabra, nervis 3–5 sub apice in verruculam confluentibus. *Petala* lutea, elliptica vel suborbicularia, in unguem fere 1.5 mm. longum abrupte contracta, ad 8 mm. longa et 5.5 mm. lata. *Stamina* in flore submasculo inaequilonga, filamentis alternatim 2 et 3.5 mm. longis, antherae thecis crassis 0.8 mm. longis pollen producentibus; in flore subfemineo 2.5 mm. longa, thecis deminutis polline carentibus. *Ovarium* in flore submasculo ovoideo-conicum, c. 2 mm. altum, stylis paullo inflexis vix 0.7 mm. longis, stigmatibus obsoletis; in flore subfemineo basi annulo lato mellifluis cinctum, c. 3 mm. altum et 4.5 mm. crassum, stylis robustis modice divaricantibus vix 1.5 mm. longis, stigmatibus robustis. *Capsula* annotina in flore submasculo (*L. & S.* 3278) non incrassata.

NEPAL: Chilime Kharka, 4,500 m., July 1949, *Poulain* 1260.

SIKKIM: Kang La, 4,500 m., July 1888, *King's collector* (Herb. Calcutta). Lampokri, 4,200 m., 13 Aug. 1913, *Rohmoo Lepcha* 880 (Herb. Edinburgh). Tangu, 4,050 m., 15 Aug. 1909, *Smith & Cave* 2568 (syntype of *S. palpebrata* var. *parceciliata* in Herb. Calcutta). Ningbil, 3,690 m., 11 Aug. 1910, *W. W. Smith* 4178 (Herb. Calcutta). Above Tosa, 4,500 m., 30 July 1910, *W. W. Smith* 3986 (syntype of *S. palpebrata* var. *parceciliata* in Herb. Calcutta).

BHUTAN: Chomolhari, 4,800 m., 12 Sept. 1912, *Rohmoo Lepcha* 531 (Herb. Edinburgh). Pangotang, Tsampa, 4,500 m.; mostly in small clumps, on cliff face, together with *Primula umbratilis*; corolla bright yellow; 1 July 1949, *Ludlow, Sherriff & Hicks* 19305 (holotype in Herb. Brit. Mus.). Shingbe, Me La, 4,500 m., 24 June 1949, *Ludlow, Sherriff & Hicks* 20400. Chesha La, 4,200 m., 27 June 1949, *Ludlow, Sherriff & Hicks* 16639. Chesha La, upper Pho Chu, 4,350 m., 25 Sept. 1949, *Ludlow, Sherriff & Hicks* 17284. Dungshinggang (Black Mountain), 4,500 m., 18 June 1937, *Ludlow & Sherriff* 3278.

S.E. TIBET: Chomolhari, near the snow, 30 July 1882, *King's collector* (Herb. Calcutta). Pele La, 4,800 m., 23 July 1914, *Cooper* 1735a (Herb. Edinburgh).

***Saxifraga deminuta* H. Sm., sp. nov. (Fig. 8 a–d.)**

Planta perennis vix 2.5 cm. alta, sublaxe caespitosa, *S. saginoidi* Hook. & Thoms. subsimilis sed foliis indumentoque distincta.

*Caulis* uniflorus, ad 12 mm. altus, pilis crispulis apice glandula nigra minutissima instructis laxè ornatus, 3–5-foliatus. *Folia* rosularia ad 10 mm. longa, petiolo lamina subbreuiore membranaceo-dilatato, margine ciliato vel nudo basin versus fimbriato-dissoluto, lamina anguste ad late lanceolata 1.2–2.6 mm. lata margine et vulgo etiam supra ciliis paucis robustis instructa, ciliis saepe fimbrio brunneo caudatis; folia caulina lanceolato-linearibus, 4–5 mm. longa, pauciciliata, basi fimbriato-ciliata, fimbriis ferrugineis pro parte longis. *Flores* erecti. *Sepala* ovato-lanceolata, subacuta, 3.5–4 mm. longa, 1.5 mm. lata, glabra vel margine ciliis 1–3 instructa, 3-nervia, nervis liberis. *Petala* lutea, obovata, minute emarginata, 4.5 mm. longa, 3 mm. lata, ecallosa. *Stamina* petalis subduplo breviora. *Ovarium* rotundato-conicum, stylis erectis 1 mm. longis. *Capsula* adhuc non visa.



BHUTAN: Me La (south side), 4,320 m.; in scree; flowers yellow; 26 Aug. 1949, *Ludlow, Sherriff & Hicks 21108* (together with *S. matta-viridis* and *S. saginoides*; holotype in Herb. Brit. Mus.).

This is a minute plant somewhat reminiscent of *S. saginoides* Hook. & Thoms., but the leaves and hairiness are very different.

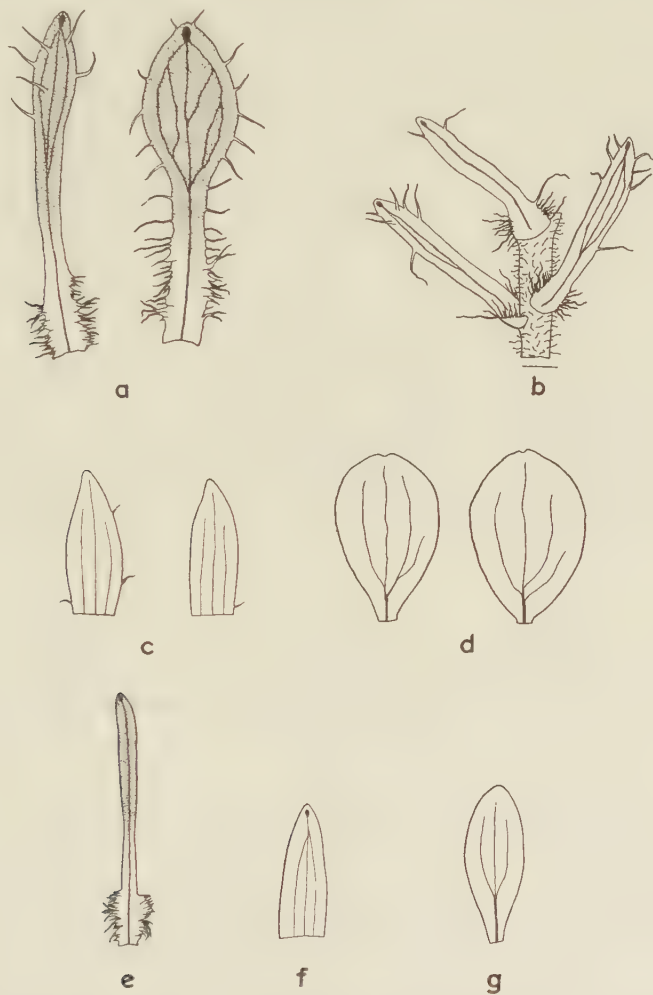


FIG. 8. *Saxifraga deminuta* H. Sm. (holotype): *a*, rosular leaves; *b*, stem with cauline leaves; *c*, sepals; *d*, petals. *S. matta-viridis* H. Sm. (holotype): *e*, rosular leaf; *f*, sepal; *g*, petal. (All  $\times 5$ .)

***Saxifraga matta-viridis* H. Sm., sp. nov. (Fig. 8 e-g.)**

*Saxifraga saginoides* sensu W. W. Sm. in Rec. Bot. Surv. Ind. iv: 368 (1913) pro parte; non Hook. & Thoms.—Engler & Irmscher in Engler, Pflanzenr. IV. 117: 121 (1916) pro parte.

*Saxifraga saginoides* var. *parvipetala* Engler & Irmscher, tom. cit.: 122 (1916).

Planta minuta, perennis, subacaulis, caespites densos humiles vivide virides formans, *S. saginoidem* Hook. & Thoms. revocans sed omnino glabra.

*Caulis* uniflorus, 3 mm. longus, 2-3-foliatus. *Folia* rosularia numerosa, 6-7 mm. longa, petiolo margine membranaceo in parte caulem amplectenti dilatato et fimbriatim dissoluto, lamina carnosa subcylindrica 0.5 mm. diam. basi in petiolum subbreviorem sensim transeunti; folia caulina eis rosularibus similia sed modice latiora. *Flores* erecti. *Sepala* lanceolata vel ovato-lanceolata, subacuta, 3.5 mm. longa, 1.2 mm. lata, nervis 3 anastomosantibus. *Petala* lutea, anguste obovata, 4.2 mm. longa, 1.6 mm. lata, ecallosa, 3-nervia. *Stamina* vix 2 mm. longa. *Ovarium* subconicum, stylis 0.5 mm. longis. *Capsula* adhuc non visa.

SIKKIM: Menentong, 3,900 m., 10 Sept. 1892, *Gammie* (Herb. Calcutta). West of Tanka La, 4,200 m., 11 Aug. 1910, *W. W. Smith* 4221 (Herb. Calcutta). Above Tosa, 4,500 m., 30 July 1910, *W. W. Smith* 3982 (syntype of *S. saginoides* var. *parvipetala* in Herb. Calcutta).

BHUTAN: Narimthang, 4,200 m.; on open hillside amidst sand and grass; flowers yellow; 26 July 1949, *Ludlow, Sherrieff & Hicks* 21352 (holotype in Herb. Brit. Mus.). Me La (south side), 4,320 m., 26 Aug. 1949, *Ludlow, Sherrieff & Hicks* 21108a (together with *S. deminuta* and *S. saginoides*).

This is the smallest species of the section, forming moss-like, vividly green mats hardly more than 1 cm. high. It is reminiscent of *S. saginoides* Hook. & Thoms., but much smaller, and is distinguished by the total absence of hairs and by the weak fleshy structure of the subcylindric leaves. The leaves of *S. saginoides* are flat, hard and shiny.

### ***Saxifraga heteroclada* H. Sm., sp. nov.**

Species verisimiliter ex affinitate *S. quadricalllosae* Hand.-Mazz. et *S. virgularis* H. Sm. Planta laxe caespitosa; rosulae parvae, et caudiculos bulbilliferos cauliformes breves vulgo erectos et caulem 1-2-florum 9-12 cm. altum edentes.

#### **Var. *heteroclada*. (Fig. 9; Plate 18 B.)**

*Caudiculi* bulbiferi, 2-3 cm. longi, 6-10-foliati, apice et in axillis foliorum bulbillis ellipsoideis parvifoliatis c. 5 instructis, eo apicali majore, axillaribus c. 2 mm. longis, foliis parvis basi dilatato gemmam amplectentibus; caulis florifer in axillis foliorum inferiorum pilis ferrugineis sparsissime instructus, ceterum glaber, 25-40-foliatus; pedicelli 1-2 cm. longi, sparse glanduloso-pilosi. *Folia* rosularia subdense conferta cum pilis longis ferrugineis intermixta, pro statura plantae perparva, 6-9 mm. longa, lamina anguste elliptica, 3 mm. longa et 1 mm. lata, apice obtusa, basi in petiolum c. 0.8 mm. latum alatum margine fusco-pilosum attenuata, supra pilis paucis ferrugineis obsita; folia caulina subaequimagina, subaequaliter disposita, angustissime lanceolato-linearata, plus minusve conduplicantia, subarcuatim patentia, suprema pauca margine sparse glanduloso-pilosa ceterum glaberrima 6-10 mm. longa et 0.75-1.5 mm. lata, infima saepe evanida. *Flores* c. 1.5 cm. diam. *Sepala* late elliptica, obtusa, ad 3 mm. longa et 2 mm. lata, hyalino-marginata, nervis 3



liberis. *Petala* aurea, late elliptica, obsolete unguiculata, ad 7 mm. longa et 4 mm. lata, minute 2-4-callosa, nervis 3-5. *Stamina* petalis  $\frac{1}{3}$  breviora. *Ovarium* superum, globoso-conicum, stylis suberectis vix 1 mm. longis.

BURMA: Nam Tamai valley, 28° N., 97° 45' E., 2,700-3,000 m.; in clumps on the cliffs within the Conifer-Rhododendron forest; scape with scattered glandular

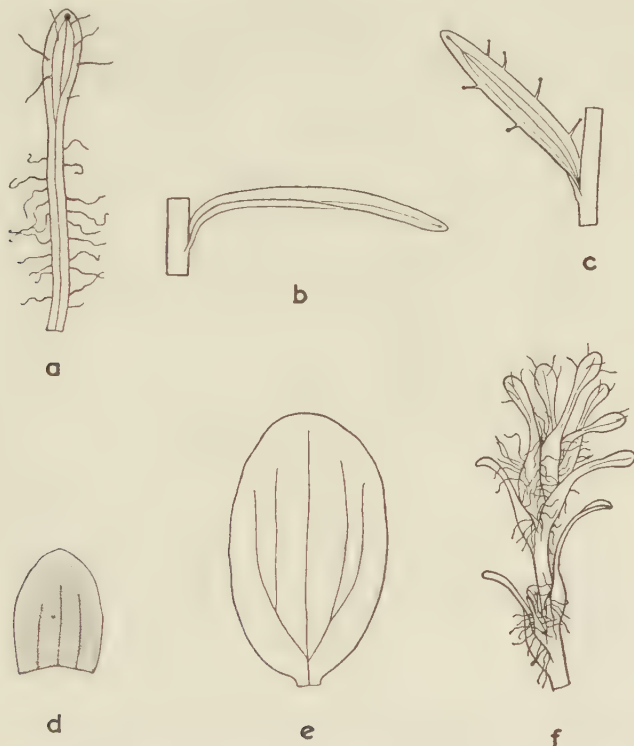


FIG. 9. *Saxifraga heteroclada* H. Sm. var. *heteroclada* (holotype): *a*, rosular leaf; *b*, median cauline leaf; *c*, upper cauline leaf; *d*, sepal; *e*, petal; *f*, top of bulbiferous shoot. (All  $\times 5$ .)

hairs, otherwise glabrous; flowers golden yellow, unspotted; 7 Sept. 1937, *Kingdon-Ward 13152* (holotype in Herb. Brit. Mus.).

**Var. *aurantia* H. Sm., var. nov.**

A var. *heteroclada* distat foliis caulinis c. 20, 1-2 mm. latis, supremis etiam eglandulosis; pedicellis glabris; sepalis margine sparse et minute glanduloso-pilosis; petalis aurantiacis, obovato-ellipticis, majoribus, 9 mm. longis et 5 mm. latis.

BURMA: Valley of the Seinghku, 28° 8' N., 97° 25' E., 3,000-3,300 m.; on rocks in steep alpine gullies; flowers orange; 30 Sept. 1926, *Kingdon-Ward 7521* (holotype in Herb. Kew).

***Saxifraga virgularis* H. Sm., sp. nov.** (Fig. 10.)

Planta ex affinitate *S. quadricalliosae* Hand.-Mazz. Rosulae in caespites densos confertae; caules 1- vel 2-flori, numerosi, 7-20 cm. alti, 25-40-foliati, stricti, graciles, ut folia nitenter glabri (floris pedicello glanduloso-piloso excepto), foliis caulinis anguste linearibus subrectis patentibusve subaequimagnis, mediis quam ceteris paullo majoribus, infimis evanidis vel emarcidis.

*Folia* rosularia ad 1.4 cm. longa, petiolo glabro basi membranaceo-dilatato et pilis longis crispulis nigrescentibus marginato, lamina anguste elliptica ad 4.5 mm. longa et 1 mm. lata supra et in margine pilis longis albescentibus ornata, apice

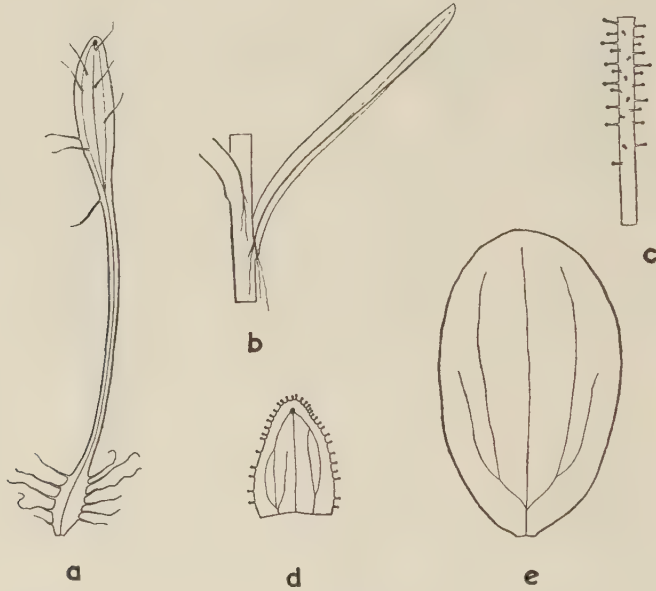


FIG. 10. *Saxifraga virgularis* H. Sm. (holotype): *a*, rosular leaf; *b*, cauline leaf; *c*, pedicel; *d*, sepal; *e*, petal. (All  $\times 5$ .)

obtusa, basi in petiolum angustum sensim attenuata; folia caulina anguste linearia, ad 8.5 mm. longa et minus quam 1 mm. lata, apice subobtusa, glabra, nitentia, infima et media in axillis pilis paucis longis ferrugineis instructa. *Hypanthium* glabrum. *Sepala* late ovata, obtusa, 2.5-3 mm. longa, 1.7-2.1 mm. lata, dorso glabra, margine breviter glanduloso-pilosa, nervis 3-5 in apicem confluentibus vel partim liberis. *Petala* aurantiaca, rotundato-elliptica, exungiculata, 6-8 mm. longa, 3-4.7 mm. lata, ecallosa, 5-nervia. *Stamina* petalis subduplo breviora. *Ovarium* superum, globoso-conicum, stylis divaricantibus vix 1 mm. longis.

BURMA: Sources of the Irrawaddy, Adung valley, 28° 20' N., 97° 40' E., 3,900 m.; in massive clumps on the granite cliffs and turf slopes facing south; basal rosette leaves with long straggling hairs; stems and stem leaves glabrous; peduncles with scattered glandular hairs; flowers bright orange, not spotted; calyx red, fringed



with fine glandular hairs ; 22 Aug. 1931, *Kingdon-Ward* 9977 (holotype in Herb. Brit. Mus.).

***Saxifraga taylorii* H. Sm., sp. nov.** (Plate 19 A.)

Species ex affinitate *S. turfosa* Engler & Irmscher. Perennis, caespitosa, estolonosa ; caules graciles, vix 10 cm. alti, e basi subdecumbenti arcuatim ascendentes et erecti, subfastigiatis 3-5-flori ; flores lutei, ad 7 mm. longi.

*Caulis* basi et in axillis modice rufo-pilosus, ceterum glaber. *Folia* rosularia 1.5-2 cm. longe petiolata, lamina late vel anguste lanceolata ad 1.2 cm. longa et 0.3-0.5 cm. lata basi in petiolum sensim contracta, vulgo glabra, interdum supra et in margine parce albo-ciliata ; folia caulina 8-13, sursum decrescentia, infima eis rosulariis subconformia crebra internodiis multo longiora, media sessilia, suprema sparsa internodiis multo breviora lanceolata vel lineari-lanceolata. *Flores* distincte proterandri, 0.5-1.5 cm. longe pedicellati, pedicello glabro vel raro pilis perpaucis minute glandulosis instructo. *Calyx* glaber, fere ad basin partitus ; sepala ovato-elliptica, non reflexa, ad 3 mm. longa et 2 mm. lata, margine submembranacea, nervis 3 liberis. *Petala* lutea, intus aurantiaco-maculata, obovata, fere exungiculata, obtusa, ad 6 mm. longa et 2.5 mm. lata, media parte diffuse pluricallosa, 3-nervia, nervis lateralibus ramosis. *Stamina* petalis paullo breviora. *Ovarium* ovoideum, stylis divaricatis vix 1 mm. longis, stigmatibus applanatis. *Capsula* matura adhuc non visa.

S.E. TIBET : Kongbo, Mira La, Puchu, 29° 30' N., 94° 10' E., 3,900 m. ; on bare gravelly scree bank ; sepals green or flushed reddish-brown ; petals golden-yellow, spotted orange within ; filaments green ; anthers yellow ; carpels green ; 12 Aug. 1938, *Ludlow, Sherriff & Taylor* 6124 (holotype in Herb. Brit. Mus.).

***Saxifraga isophylla* H. Sm., sp. nov.** (Fig. 11 ; Plate 19 B.)

Planta *S. auriculatae* Engler & Irmscher affinis et habitu subsimilis, tamen statura graciliore, caule ferrugineo-piloso (nec glanduloso-piloso), foliis (supremis exceptis) petiolatis, lamina basi acuta lanceolata, margine paginisque ferrugineo-pilosa (nec basi lata subsessili, margine paginisque dense et minute glanduloso-pilosa), inter alia distincta.

*Caules* solitarii (?), basi foliis paucis rosulariis cincti, 16-24 cm. alti, pilis perlongis crispulis ferrugineis modice obsiti, 22-29-foliati ; inflorescentia ad 4.5 cm. longa, 5-15-flora, subumbellatim ramosa, pedicellis floribus sublongioribus pilis tenuibus glanduliferis cum paucis crispulis intermixtis instructis. *Folia* caulina fere aequimagna sursum paullulo decrescentia, infima ad 5 mm. longe petiolata lamina c. 12 mm. longa et 4 mm. lata in petiolum sensim attenuata, media et superiora basi acuta subsessilia vel sessilia lamina margine paginisque longe ferrugineo-pilosa, suprema pauca praeterea margine breviter glanduloso-pilosa. *Flores* distincte proterandri. *Hypanthium* glanduloso-pilosum pilis ferrugineis intermixtis. *Sepala* ovato-lanceolata, subobtusa, c. 4 mm. longa, 2-2.5 mm. lata, dorso margineque glanduloso-pilosa, nervis 3-5 sub apice in verruculam confluentibus. *Petula* aurea, oblongo-linearis, auriculatim in unguem 1 mm. longum perabrupte contracta, obtusa, ad

6.5 mm. longa et 2.5 mm. lata, 3-nervia. *Stamina* petalis duplo breviora. *Ovarium*  $\frac{1}{3}$  inferum, globoso-conicum, stylis robustis fere 2 mm. longis, stigmatibus magnis applanatis.

S.E. TIBET: Kongbo, Deyang La, 4,050 m.; in clefts of rocks; calyx green; corolla golden-yellow; 11 Aug. 1947, Ludlow, Sherriff & Elliot 14329 (holotype in Herb. Brit. Mus.).

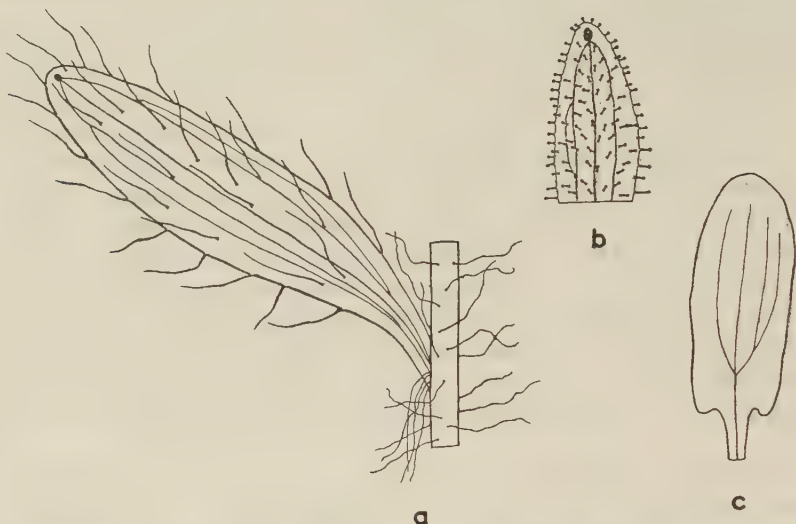


FIG. 11. *Saxifraga isophylla* H. Sm. (holotype): *a*, median cauline leaf; *b*, sepal; *c*, petal. (All  $\times 5$ .)

#### Grex NUTANTES Engler & Irmscher

##### *Saxifraga haematochroa* H. Sm., sp. nov.

Planta perennis *S. bergenioidi* Marquand affinis, sed statura minore (1–4 cm.), floribus subacaulibus solitariis atrorubris, distincta.

*Rosulae* singulae (an semper?), e basi innovationes tenues suberectas et florem apicalem subacaulem producentes, a basi subimbricatim foliatæ, foliis vetustis mortuis persistentibus; caulis brevissimus, glaber. *Folia* glabra, margine solum parce longipilosa, pilis aetate evanidis; lamina subcoriacea, late lanceolata, ad 8 mm. longa et 4 mm. lata, apice subobtusata, basi in petiolum late alatum margine longipilosum ad 3 mm. longum sensim contracta. *Flores* hermaphroditi, foliis supremis subinvolucrati, c. 7 mm. longi et 10 mm. diam. *Calyx* fere ad basin partitus, glaber; sepala late oblanceolato-obovata, obtusa, c. 5 mm. longa et 3 mm. lata, margine interdum leviter lacerata, nervis 3–5, majoribus sub apice confluentibus. *Petala* atrorubri, rotundato-obovata, 1 mm. longe unguiculata, minute emarginata, ad 7 mm. longa et 4 mm. lata, 5-nervia. *Stamina* ad 5 mm. longa, antherae thecis 0.7 mm. longis. *Ovarium* crassum, ovoideum, stylis distinctis fere 1 mm. longis, stigmatibus applanatis. *Capsula* matura adhuc non visa.



BHUTAN : Me La, 4,500 m., 8 Aug. 1933, *Ludlow & Sherriff* 445.

S.E. TIBET : Kongbo, Mira La, Nyang Chu, Puchu, 29° 30' N., 94° 15' E., 4,650 m. ; on large block boulder scree in moss ; sepals dark crimson ; petals deep velvety-crimson ; filaments white, tinged pale crimson ; anthers black ; carpels, styles and stigmas green ; 14 Aug. 1938, *Ludlow, Sherriff & Taylor* 6070 (holotype in Herb. Brit. Mus.).

The Bhutan specimens differ from the type in having more marked and, as a rule, persistent ciliation on the margins of the leaves and sepals. Future collections will show if this difference has any taxonomic significance. Probably it falls within the natural variability of the species.

This peculiar plant with blood-red flowers is undoubtedly connected with *S. bergenoides* Marquand, which was regarded by its author as a relation of *S. viscidula* Hook. & Thoms. and *S. lychnitis* Hook. & Thoms. I can see no reason for this view. *S. bergenoides* is in many respects reminiscent of *S. nutans* Hook. & Thoms., and I place it without hesitation together with that species in *Grex Nutantes*. My new species *S. haematochroa* belongs of course to the same group.

#### *Grex GEMMIPARAE* Engler & Irmscher

SAXIFRAGA GOULDII C. E. C. Fisch. in Kew Bull. 1939 : 664 (1940).

Var. *eglandulosa* H. Sm., var. nov. (Fig. 12 a-c ; Plate 20 A.)

A typo (var. *gouldii*) distat petalis margine eglandulosis, superiore dimidia parte minute laciniatis.

BHUTAN : Tolegang, Tsampa, 4,050-4,200 m. ; common among dwarf Rhododendrons on open steep hillside ; calyx dull deep red ; corolla bright golden ; 10 Sept. 1949, *Ludlow, Sherriff & Hicks* 19731 (holotype in Herb. Brit. Mus.). Bumthang Chu, Ju La, 4,200 m., 21 July 1949, *Ludlow, Sherriff & Hicks* 16915a.

S.E. TIBET : Between Me La and Cho La, 4,050 m., 21 Aug. 1949, *Ludlow, Sherriff & Hicks* 21412. Rip La, Tsari, 4,200 m., 16 Aug. 1936, *Ludlow & Sherriff* 2086. Cha La, 4,050 m., 18 Aug. 1934, *Ludlow & Sherriff* 843.

*S. gouldii* differs from the closely related *S. wardii* W. W. Sm. (Fig. 12 d-f) by the more numerous and more narrow leaves of which only the uppermost have glands on some of the marginal spinules, by a usually taller stem, and by the shape of the petals. In *S. wardii* the petals are abruptly unguiculate, the limb nearly orbicular with the margin adorned all round with crimson glands (black when dry). In var. *gouldii*, which is recorded from further west in Bhutan and Tibet, the glands are restricted to the upper part of the petal and the limb is cuneately narrowed into the claw. The new variety agrees perfectly with the typical one except that the upper part of the petal is finely lacinate instead of bearing marginal glands. It is noteworthy that only this variety was collected. It is hardly to be supposed that the typical plant was overlooked. Var. *eglandulosa* may thus be geographically distinct ; or it may represent the normal condition of the species, and var. *gouldii* a rare modification.

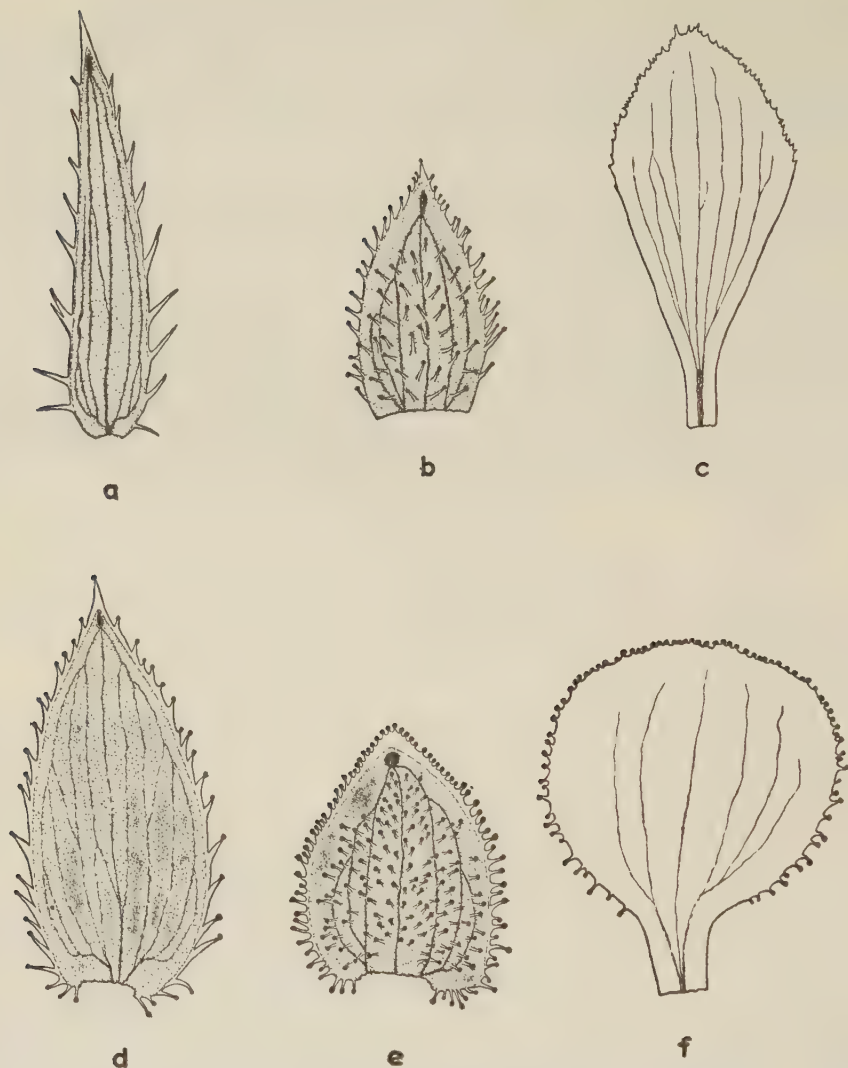


FIG. 12. *Saxifraga gouldii* var. *eglandulosa* H. Sm. (holotype): *a*, cauline leaf; *b*, sepal; *c*, petal. *S. wardii* W. W. Sm. (Ludlow, Sherriff & Hicks 16915): *d*, cauline leaf; *e*, sepal; *f*, petal. (All  $\times 5$ .)

***Saxifraga erinacea* H. Sm., sp. nov.** (Fig. 13 *a-e*; Plate 20 B.)

Species ex affinitate *S. brachypodae* D. Don. Planta subdioica, glabra, caulibus sterilibus et fertilibus aggregatis erectis c. 1 (-2) cm. altis densissime foliatis.

*Caules* glabri, internodiis brevissimis. *Folia* aequimagna, nitentia, lanceolata, 6-7 mm. longa, 1.5-2 mm. lata, margine hyalino-cartilaginea et cartilagineo-spinulosa, spina apicali maxima ad 1.5 mm. longa, lateralibus paullo minoribus pro latere



6-8 omnibus eglandulosis, nervis 3 sub apice confluentibus lateralibus (in sicco) conspicuis. Flores solitarii, apicales, subsessiles, c. 9 mm. longi. Sepala ovata, 5-5.5 mm. longa, 2.5-3 mm. lata, margine cartilagineo-spinulosa, spinis (basalibus

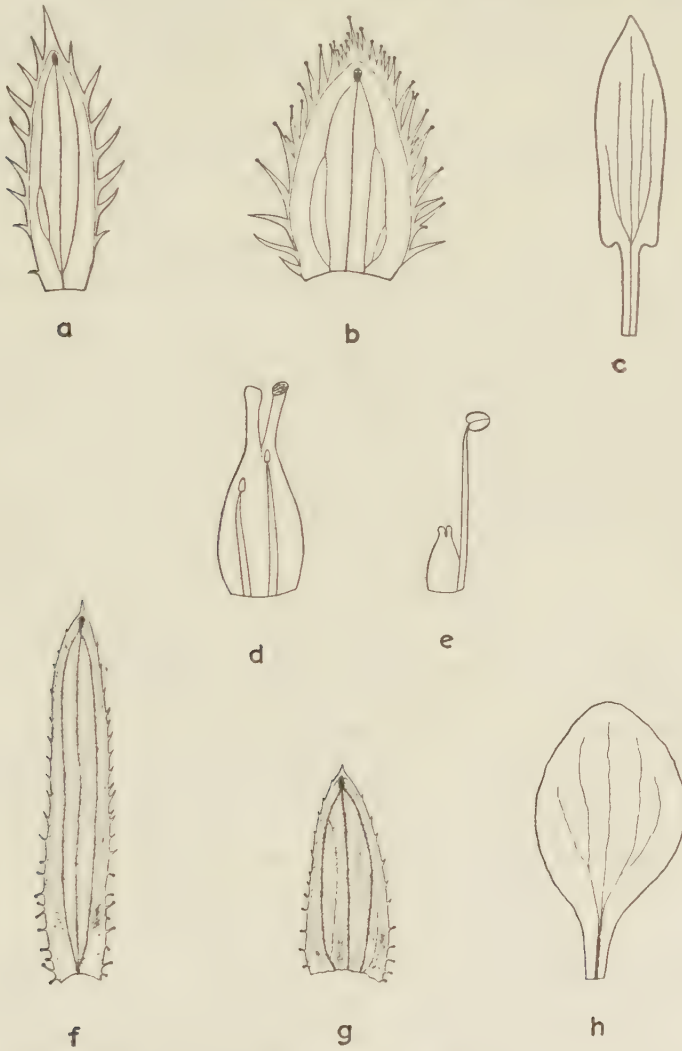


FIG. 13. *Saxifraga erinacea* H. Sm. (holotype): a, cauline leaf; b, sepal; c, petal; d, ovary and stamens from subfemale flower; e, ovary and stamen from submale flower. *S. serrula* H. Sm. (holotype): f, cauline leaf; g, sepal; h, petal. (All  $\times 5$ .)

exceptis) glanduliferis, apicalibus praesertim erecto-directis, nervis 3 basali parte ramosis sub apice confluentibus. Petala lutea, lanceolato-lineariter, supra unguem 2.5 mm. longum auriculata, acuta, c. 8 mm. longa et 2 mm. lata, nervis 3-5. Stamina in planta submascula 5 mm. longa, antherae thecis subglobosis vix 0.6 mm. longis;

in planta subfeminea 3-4 mm. longa, thecis minutis polline carentibus. *Ovarium* in planta submascula reductum, aetate non increscens; in planta subfeminea ovoideum, c. 5 mm. longum, stylis erectis subclaviformibus 1.5 mm. longis. *Capsula* matura adhuc non visa.

BHUTAN: Me La, 4,200 m., 4 Aug. 1933, *Ludlow & Sherriiff* 376 (stem up to 2 cm. in length). Me La-Cho La valley, 4,200 m., 2 July 1949, *Ludlow, Sherriiff & Hicks* 20912.

S.E. TIBET: Between Me La and Cho La, 4,050 m.; on open hillside; corolla bright yellow; 21 Aug. 1949, *Ludlow, Sherriiff & Hicks* 21409 (holotype in Herb. Brit. Mus.).

***Saxifraga serrula* H. Sm., sp. nov.** (Fig. 13 f-h; Plate 21 A.)

Planta ex affinitate *S. brachypodae* D. Don, habitu, quamquam robustior et parce ramosa, *S. filicaulem* Wall. ex Ser. aemulans.

*Caulis* uniflorus, 4-16 cm. longus, c. 0.6 mm. diam.; pars infima, annotina vel vetustior, decumbens, 1-8 cm. longa, foliis evanidis vel emarcidis; pars superior ascenderet erecta, unilateraliter pauciramosa, ramis 2-4 cm. longis sterilibus densifoliatis. *Folia* caulina linearia, patentia, saepe arcuato-recurvantia, caulem subamplectentia, c. 10 mm. longa et 1.5 mm. lata, nitentia, apice mucronata, infima minore parte marginis glanduloso-pilosa, superiore maiore parte minute et acutissime cartilagineo-ciliata, nervis 3 sub apice confluentibus, lateralibus conspicue impressis. *Flores* apicales, 1-1.5 cm. longe pedicellati, pedicello pilis strictis glanduliferis ecoloratis subdense obsito. *Sepala* anguste ovata, 5.5 mm. longa, 2.2 mm. lata, ceterum foliis conformia. *Petala* lutea, elliptica, in unguem 1.5 mm. longum contracta, c. 7.5 mm. longa et 4 mm. lata, ecallosa. *Stamina* petalis paullo breviora, antherae thecis subglobosis 0.5 mm. longis. *Ovarium* superum, ovoideum, 3.4 mm. altum, stylis divaricantibus fere 2 mm. longis.

BHUTAN: Chendebi, 3,000 m.; midst grass on dry soil; calyx green; corolla yellow; 7 Aug. 1949, *Ludlow, Sherriiff & Hicks* 17073 (holotype in Herb. Brit. Mus.).

This is an interesting plant, which unquestionably links the rather isolated *S. filicaulis* Wall. ex Ser. with the *S. brachypoda* group.

#### Grege SEDIFORMES Engler & Irmischer

***Saxifraga contraria* H. Sm., sp. nov.** (Fig. 14 a-d.)

Planta foliis oppositis singularis, *S. engleranae* H. Sm. remote affinis. Caespites laxes humiles formans, caulibus numerosis 1.2-3.3 cm. altis unifloris.

*Caudiculi* glabri, primum hypogaei, repentes, tenuissimi, sparse et minutissime foliati, ramificantes demum assurgentes accrescentes densius et robustius foliati apice caulem floriferum producentes; caulis florifer pilis brevibus crispulis albescens rufescentibusve eglandulosis instructus. *Folia* caudiculorum semper opposita, basi non connata, carnosa, elliptico-obovata, ad 2.5 mm. longa et c. 2 mm. lata, glabra; folia caulina in paribus 1-2 opposita vel interdum alternantia, 3-4 mm. longa, c. 2 mm. lata, glabra. *Sepala* glabra, late ovato-elliptica, ad 2.5 mm. longa et 2 mm. lata, nervis 3 sub apice confluentibus. *Petala* lutea vel aurantiaca, elliptica,

breviter unguiculata, 3.5-4 mm. longa, 1.8 mm. lata, subelevate 2-callosa, 3-nervia. *Stamina* petalis  $\frac{1}{2}$  breviora, antherae thecis crassis 0.8 mm. longis. *Ovarium* superum, basi annulatum, globoso-conicum, stylis 0.5 mm. longis.

NEPAL : Arun-Tamur watershed, Thagla Bhanjyang, north of Topke Gola, 4,500 m., 14 July 1956, *Stainton* 995.

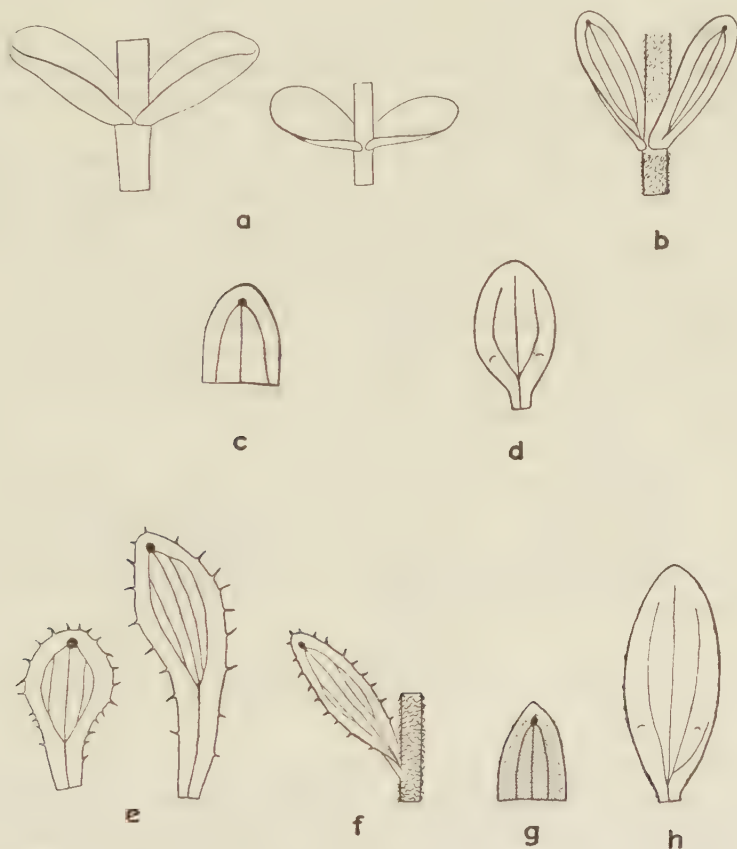


FIG. 14. *Saxifraga contraria* H. Sm. (holotype) : *a*, caudex with leaves ; *b*, stem with cauline leaves ; *c*, sepal ; *d*, petal. *S. miralana* H. Sm. (holotype) : *e*, rosette leaves ; *f*, stem with cauline leaf ; *g*, sepal ; *h*, petal. (All  $\times 5$ .)

BHUTAN : Gafoola, upper Pho Chu, 4,200 m., 5 July 1949, *Ludlow, Sherriff & Hicks* 16736. Waitang, Tsampa, 4,200 m. ; in little clumps among stones beside streams ; corolla yellow ; 17 June 1949, *Ludlow, Sherriff & Hicks* 19178 (holotype in Herb. Brit. Mus.). Marlung, Tsampa, 4,350 m., 9 July 1949, *Ludlow, Sherriff & Hicks* 19390.

S.E. TIBET : Reting, 60 miles north of Lhasa, 4,350 m., 18 July 1944, *Ludlow & Sherriff* 11017.



Forma **rubella** H. Sm., forma nov.

A typo distat petalis aurantiaco-rubris paullo latioribus, stylis fere 1 mm. longis.

BHUTAN: Woji, upper Pho Chu, 3,900 m.; on rocks in stony river bed; calyx green; corolla orange-red; filaments red, anthers yellow; ovary red-green; 21 June 1949, *Ludlow, Sherriff & Hicks 16605* (holotype in Herb. Brit. Mus.).

**Saxifraga miralana** H. Sm., sp. nov. (Fig. 14 e-h.)

Species affinis *S. engleranae* H. Sm., a qua distat statura robustiore, foliis omnibus margine aculeolato-ciliatis (nec glabris), floribus majoribus, petalis angustioribus. Dense caespitosa, caulibus numerosis 1-2.5 cm. altis unifloris.

*Caulis* florifer pilis brevibus crispulis albescentibus eglandulosis laxè vestitus, inferiore tertia parte 1-3-foliatus, foliis supremis interdum oppositis. *Folia* rosularia crassiuscula, rigida, obovato-spathulata, ad 9 mm. longa et c. 2 mm. lata, margine argute aculeolato-ciliata, nervis ramosis in verruculam confluentibus; folia caulina 3-5 mm. longa, 1.3 mm. lata, margine ciliata. *Hypanthium* glabrum. *Sepala* ovato-triangularia, patentia sed non reflexa, 1.6-2 mm. longa, 1.5 mm. lata, glabra, nervis 3 sub apice confluentibus. *Petala* lutea, medio aurantiaco-maculata, elliptica, vix unguiculata, subacuta, 6-7 mm. longa, 2.5 mm. lata, ecallosa vel obsolete 2-callosa, 3-nervia. *Stamina* petalis  $\frac{1}{3}$  breviora. *Ovarium* superum, parum fissum, globoso-conicum, stylis 0.5 mm. longis.

S.E. TIBET: Kongbo, Puchu, Nyang Chu, Mira La, 29° 30' N., 94° 15' E., 4,800 m.; on loose granitic scree; sepals green, mottled reddish-purple, spreading; petals lemon-yellow, spotted orange-yellow in the middle; filaments greenish-yellow; anthers greenish-yellow; capsule green; 16 Aug. 1938, *Ludlow, Sherriff & Taylor 6078* (holotype in Herb. Brit. Mus.).

SAXIFRAGA STELLA-AUREA Hook. & Thoms. in Journ. Proc. Linn. Soc. Lond., Bot. ii: 72 (1857).

Var. **polyadena** H. Sm., var. nov. (Fig. 15 a-c.)

A typo (var. *stella-aurea*) distat planta majore et robustiore; rosulae foliis ad 4.5 mm. longis et 1.6 mm. latis, margine et dorsi apicali dimidia parte glanduloso-pilosis (nec margine solum sparsim glandulosis); sepalis ad 2.2 mm. longis et 1.6 mm. latis, dorso margineque glanduloso-pilosis (nec ad 1.9 mm. longis et 1.3 mm. latis, glabris vel rarissime glandulis perpaucis instructis).

NEPAL: Kholā Kharka, 4,050 m., 17 July 1949, *Polunin 1090*. Langtang valley, 4,500 m., June 1949, *Polunin 665*. Chilime Kharka, 4,500 m., July 1949, *Polunin 1152*. Same locality, 1949, *Polunin 1484*. Chilime Kharka-Chilimagaon, 4,500 m., 26-28 July 1949, *Polunin 1470*.

S.E. TIBET: Kongbo, Budi Tsepo La, 3,900 m.; in mats on rock; corolla yellow or orange-yellow or orange-red; 21 Aug. 1947, *Ludlow, Sherriff & Elliot 14425* (holotype in Herb. Brit. Mus.). Same locality, 3,900 m., 21 Aug. 1947, *Ludlow, Sherriff & Elliot 14423*. Same locality, 4,050 m., 18 June 1947, *Ludlow, Sherriff & Elliot 15270*. Kongbo, Mira La, Nyang Chu, Puchu, 4,650 m., 15 Aug. 1938, *Ludlow,*

*Sherriff & Taylor 6074* (together with *S. jacquemontiana*). Kongbo, Pero La, Tsangpo valley, 29° 30' N., 95° E., 4,050 m., 9 July 1938, *Ludlow, Sherriff & Taylor 5194* (together with var. *stella-aurea*). Salween-Tsangpo divide, N.E. of Shugden Gampa, 4,800 m., 11 Aug. 1933, *Kingdon-Ward 10750a*.

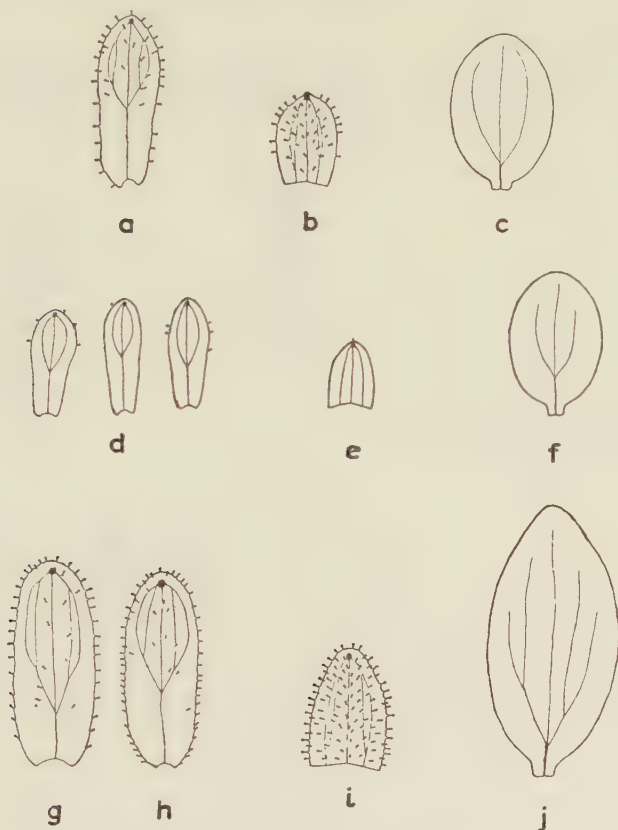


FIG. 15. *Saxifraga stella-aurea* var. *polyadena* H. Sm. (holotype): a, rosular leaf; b, sepal; c, petal. *S. stella-aurea* Hook. & Thoms. var. *stella-aurea* (*Ludlow, Sherriff & Elliot 14424*): d, rosular leaves; e, sepal; f, petal. *S. finitima* W. W. Sm. (*Kingdon-Ward 4096*, except h): g, rosular leaf; h, rosular leaf (type coll.); i, sepal; j, petal. (All  $\times 5$ .)

The var. *polyadena* is not uniform, and is probably the result of hybridization between *S. stella-aurea* var. *stella-aurea* (Fig. 15 d-f) and *S. finitima* W. W. Sm. (Fig. 15 g-j) or *S. jacquemontiana* Decne., being sometimes reminiscent of the one (*L., S. & E. 14423*), sometimes of the other (*L., S. & T. 5194*).

#### *Saxifraga lhasana* H. Sm., sp. nov.

Species ex affinitate *S. umbellulatae* Hook. & Thoms., a qua inter alia distat rosulae foliorum lamina crebre aculeolato-ciliata (nec glabra vel in statu juvenili

sparsissime ciliata), petalis albis (nec luteis), staminum filamentis vix 3 mm. longis (nec 4 mm.). Rosulae solitariae vel paucae arcte confertae, densissime foliatae, 1.5–2.4 mm. diam.; caulis florifer 4–6 cm. altus; flores 5–11 in ramis 3–4 subumbellatim dispositis.

Var. *lhasana*. (Fig. 16 a-f.)

*Caulis* florifer tota longitudine glanduloso-pilosus. *Folia* rosularia 5–10 mm. longa, 1.5–1.8 mm. lata, lamina rotundato-elliptica apice incrassata et modice

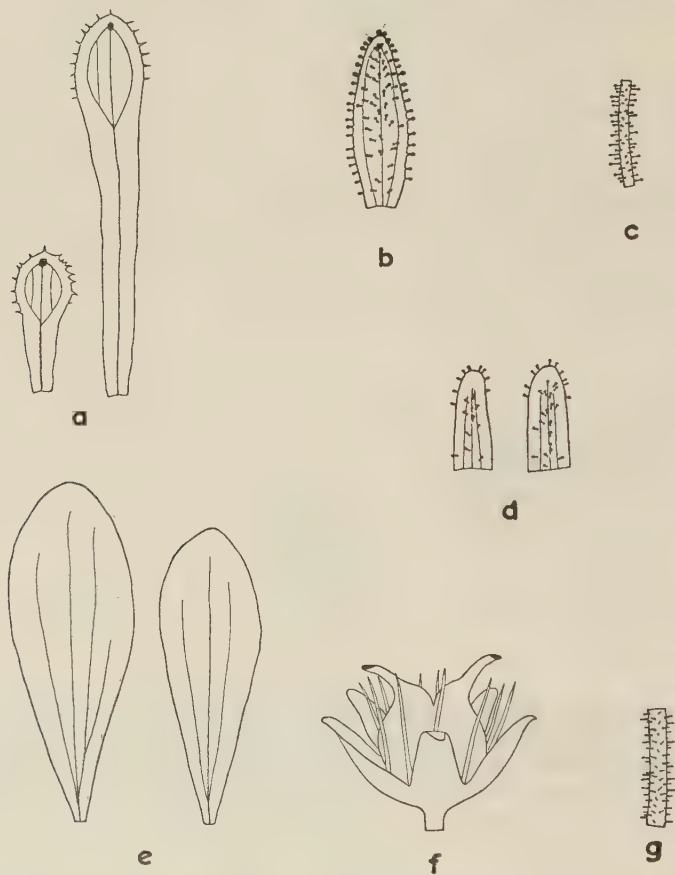


FIG. 16. *Saxifraga lhasana* H. Sm. var. *lhasana* (holotype): a, rosular leaves; b, cauline leaf; c, pedicel; d, sepals; e, petals; f, capsule (hairiness not depicted). *S. lhasana* var. *decapitulata* H. Sm. (holotype): g, pedicel. (All  $\times 5$ .)

recurvanti, basi in petiolum fere aequilatum parum attenuata margine aculeolato-ciliata; folia caulina sparsa, sub umbellam 3–5 conferta, lanceolata, ad 5 mm. longa et 1.5 mm. lata, apice obtusa, dorso margineque glanduloso-pilosa, glandulis apicalibus majoribus subsessilibus. *Hypanthium* glanduloso-pilosum. *Sepala* ovato-



linearia, obtusa, ad 2.6 mm. longa et c. 1 mm. lata, dorso etiam marginis hyalino-membranacei apicali dimidia parte sparse et tenuiter glanduloso-pilosa, nervis 3 liberis. *Petala* alba, anguste obovata, ad basin sensim angustata 8-9 mm. longa, 2.6-3.2 mm. lata. *Stamina* petalis fere triplo breviora. *Ovarium* superum, in maturitate subglobosum 2.8 mm. longum et crassum, stylis divaricantibus 1 mm. longis.

S.E. TIBET: Reting, 60 miles north of Lhasa, 4,650 m.; on large boulders; flowers white; 31 July 1942, *Ludlow & Sherriff* 8997 (holotype in Herb. Brit. Mus.). Same locality, 4,200 m., 20 July 1944, *Ludlow & Sherriff* 11039. Lhasa, 3,600 m., 1 July 1943, *Ludlow & Sherriff* 9734. Vicinity of Lhasa, July 1939, *Richardson* 237.

**Var. decapitulata** H. Sm., var. nov. (Fig. 16 g.)

A var. *lhasana* distat pilis totae plantae nigris glandula normaliter destitutis, apice obsolete incrassatis; planta robustiore, inflorescentia magis divaricato-ramosa; sepalis lineari-triangularibus, minus hyalino-marginatis; petalis ad 3 mm. latis, magis patentibus; capsula majore ad 3.8 mm. longa et crassa.

S.E. TIBET: Gyamda valley, above Gyamda, 3,300-3,600 m.; on sunny cliffs; flowers white; 23 Aug. 1935, *Kingdon-Ward* 12254 (holotype in Herb. Brit. Mus.).

**Saxifraga brunneopunctata** H. Sm., sp. nov. (Fig. 17 a-d.)

Species affinis *S. umbellulatae* Hook. & Thoms., a qua distat statura minore, rosulae foliorum lamina margine breviter aculeolato-ciliata (nec glabra vel in statu juvenili sparsissime ciliata), floribus minoribus, petalis brunneo-punctatis, stylis brevissimis in capsula matura stricte patentibus (nec 1 mm. longis, suberectis).

*Rosulae* solitariae vel paucae arcte confertae, densissime foliatae, 1-1.8 cm. diam., caulem floriferum 2-4 cm. altum dense glanduloso-pilosum c. 12-foliatum edentes, floribus 1-11 in ramis 1-4 subumbellatim dispositis. *Folia* rosularia spatulata, 5-7 mm. longa, lamina elliptica 2-2.5 mm. lata in petiolum latum modice angustata margine breviter aculeolato-ciliata, nervis c. 5 in verruculam confluentibus; folia caulina ovato-lanceolata, ad 4.5 mm. longa, dorso margineque subdense glanduloso-pilosa, glandulis apicalibus magnis fere sessilibus. *Hypanthium* glanduloso-pilosum. *Sepala* ovata, subobtusa, vix 2 mm. longa et 1.3 mm. lata, dorso modice, etiam margine membranaceo sparsissime, minute glanduloso-pilosa, nervis 3-5 sub apice in verruculam confluentibus. *Petala* lutea, inferiore dimidia parte minute brunneo-punctata, lanceolata, exungiculata, subobtusa, ad 5 mm. longa et 1.6 mm. lata, obsolete 2-callosa, 3-nervia. *Stamina* petalis paullo breviora. *Ovarium* superum, subglobosum, stylis brevissimis demum valde divaricatis.

S.E. TIBET: Chu Nullah, Gyantse, 30 Aug. 1925, *Ludlow* 169. Reting, 60 miles north of Lhasa, 4,800 m.; in open moorland on top of pass; flowers yellow with orange anthers; 21 July 1942, *Ludlow & Sherriff* 8848 (holotype in Herb. Brit. Mus.). Same locality, 4,200 m., 29 July 1944, *Ludlow & Sherriff* 11079. Vicinity of Lhasa, 3,900 m., Sept. 1939, *Richardson* 260. Hills south of Lhasa, Sha La, 4,200 m., 11 July 1943, *Ludlow & Sherriff* 9750.

***Saxifraga anadena* H. Sm., sp. nov.** (Fig. 17 *e-h*.)

Planta habitu *S. heterotrichae* Marquand & Airy Shaw subsimilis, sed caule et foliorum caulinorum margine pilis eglandulosis subrobustis erectis nigro-rubescens brevissimis (0.2 mm. vel minus longis) sublaxe instructis, valde distincta.

*Rosulae* solitariae vel paucae confertae, densissime foliatae, c. 1 cm. diam.; caulis florifer tenuis, 4-5 cm. altus, laxe 8-13-foliatus, flores 1-2 longe pedicellatos

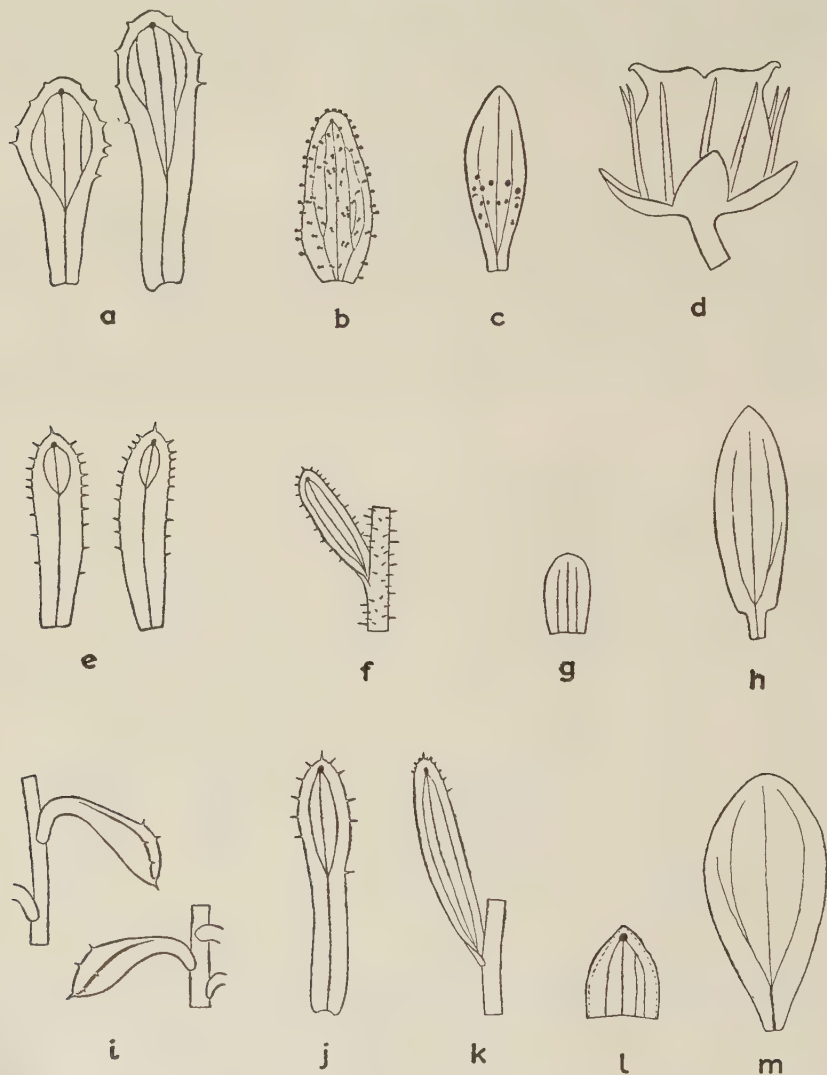


FIG. 17. *Saxifraga brunneopunctata* H. Sm. (holotype) : *a*, rosular leaves ; *b*, cauline leaf ; *c*, petal ; *d*, capsule (hairiness not depicted). *S. anadena* H. Sm. (holotype) : *e*, rosular leaves ; *f*, stem with cauline leaf ; *g*, sepal ; *h*, petal. *S. anisophylla* H. Sm. (holotype) : *i*, caudicles with leaves ; *j*, rosular leaf ; *k*, stem with cauline leaf ; *l*, sepal ; *m*, petal. (All  $\times 5$ .)

gerens. *Folia* rosularia sublinearia, 3-5.5 mm. longa, ad 1.2 mm. lata, apice acuta, margine superiore dimidia parte, vel ultra, breviter aculeolato-ciliata, ciliis inferioribus tenuioribus; folia caulina linearia, apice obtusa, nervis 3 sub apice confluentibus. *Hypanthium* glabrum. *Sepala* late linearia, rotundato-obtusa, in anthesi reflexa, 2 mm. longa, 1.2 mm. lata, glabra, nervis 3 liberis. *Petala* lutea, lanceolata, breviter sed distincte unguiculata, subobtusa, 6 mm. longa, 1.9 mm. lata, 3-nervia. *Stamina* petalis vix  $\frac{1}{3}$  breviora. *Ovarium* superum, parum fissum, globoso-cylindricum, stylis 0.7 mm. longis aetate divaricantibus.

S.E. TIBET: Kongbo, Penam Chu, near Je, Pasum Tso, 3,900 m., 8 July 1947, Ludlow, Sherriff & Elliot 14092. Kongbo, Ba La, Pasum Chu, 4,350 m.; calyx reddish-green; corolla yellow; 29 June 1947, Ludlow, Sherriff & Elliot 14033a (holotype in Herb. Brit. Mus.).

***Saxifraga anisophylla* H. Sm., sp. nov. (Fig. 17 i-m.)**

Species fortasse *S. filifoliae* Anthony affinis, sed multo major. Planta caespites magnos laxos formans, pilis glandulisque omnino destituta etiamsi foliis margine modice aculeolato-ciliatis; caules numerosi, nitenter glabri, 6-16 cm. alti, uniflori vel ramos 1-3 distantes unifloros gerentes.

*Caudiculi* trimorphi: hypogaei tenuissimi, longe repentes, sparse et minutissime foliati; epigaei laxe caespitosi, repentes, ad 12 cm. longi, laxe foliati, foliis recurvato-patentibus breviter petiolatis, lamina valde incrassata obovata ad 3 mm. longa et 2 mm. lata, apice margineque parce et breviter aculeolato-ciliata; caudiculi demum rosulam dense foliatam ad 1.3 cm. diam. formantes, foliis lineari-spathulatis ad 7 mm. longis, lamina incrassata elliptica fere 3 mm. longa et 1.4 mm. lata, basi in petiolum latum modice angustata, margine remote aculeolato-ciliata; folia caulina 6-10, remota, lanceolato-linearia, ad 6 mm. longa et 1.2 mm. lata, suprema integra, media et inferiora apicaliter modice aculeato-ciliata. *Hypanthium* glabrum. *Sepala* acute ovata, patentia, ad 2.5 mm. longa et 1.9 mm. lata, glabra, anguste hyalino-marginata, nervis 3-5 sub apice confluentibus. *Petala* lutea, inferne aurantiaco-maculata, obovata, exungiculata, ad 6.5 mm. longa et 3.2 mm. lata, obsolete 2-callosa, nervis 3-5. *Stamina* petalis subduplo breviora. *Ovarium* superum, globoso-conicum, stylis brevissimis (an planta submascula solum collecta?).

BURMA: Sources of the Irrawaddy, Adung valley, 28° 20' N., 97° 40' E., 3,900 m.; in clumps amongst coarse boulders; calyx, stems and fleshy stem leaves glabrous; basal rosette leaves also fleshy with bristly margins, the bristles colourless and wide apart; flowers bright yellow, only the lower half of the petals spotted with orange; 5 Aug. 1931, Kingdon-Ward 9904 (holotype in Herb. Brit. Mus.).

Sect. SAXIFRAGA (Sect. *Nephrophyllum* Gaudin)

GreX SIBIRICAE Engler & Irmscher

***Saxifraga granulifera* H. Sm., sp. nov. (Plate 21 B.)**

Planta ex affinitate *S. cernuae* L. sed distat caule gracili, foliis caulinis subaequimagnis, bracteis foliaceis lobatis, bulbillis minutissimis in axillis foliorum solum productis (nec etiam ad basin caulis et ad bracteas lineares numerosas).



*Caulis* 10–25 cm. altus, 0.4–1.2 mm. diam., simplex vel superne pauciramosus, 6–8-foliatus, deorsum albo-pilosus, sursum glanduloso-pilosus. *Folia* omnia tenera vix crassiuscula; basalia longe petiolata, lamina ambitu subrotundata ad 1 cm. longa et 1.3 cm. lata palmatim c. 6-loba, lobis late ovatis ad triangulari-ovatis; folia caulina sursum modice decrescentia, brevius petiolata, lamina ambitu subrotundata palmato-lobata, lobis triangularibus, in bracteis perpaucis lobatis sensim deminuta. *Bulbilli* 1-plures, ovoidei, c. 0.5 × 0.7 mm. magni, glabri, in axillis foliorum caulis producti. *Flores* 1–2 cm. longe pedicellati, 1–5 (–9) in apicibus ramorum solitarii. *Calycis* tubus 1 mm. longus vel brevior; sepala ovato-lanceolata, 2 mm. longa et 1 mm. lata. *Petala* alba vel sulphurea, oblongo-lineararia, ad 7 mm. longa et 2.5 mm. lata. *Stamina* 2.5–3 mm. longa, antherae thecis subrotundatis c. 0.3 mm. diam. *Ovarium* ovoideum, stylis erectis 1.3 mm. longis.

NEPAL: Bhurchula Lekh, near Jumla, 3,750 m., 10 July 1952, *Polunin, Sykes & Williams* 4504. Maharigaon, 3,900 m., 21 July 1952, *Polunin, Sykes & Williams* 234. Near Tarakot, Bheri River, c. 3,450 m., 14 July 1952, *Polunin, Sykes & Williams* 2459. Near Phagune Dhuri, 3,600 m., 7 July 1954, *Stainton, Sykes & Williams* 3413. Rambrong, Lamjung Himal, 4,350 m., 7 July 1954, *Stainton, Sykes & Williams* 6220. Bimtakothi, 3,750 m., 27 Aug. 1950, *Lowndes* 1468. Ganesh Himal, Shiar Khola, 3,150 m., 18 July 1953, *Gardner* 1409. Langtang, lateral valley, 3,600–3,750 m., 1 Aug. 1949, *Polunin* 1507. Changbu Khola, 4,350 m., 15 June 1949, *Polunin* 316. Bozal, 2,700 m., 30 Aug. 1931, *Sharma* 1113. Bheding, 3,600–3,900 m., 1930, *Lall Dhwaj* 0330.

BHUTAN: Leji, upper Pho Chu, 3,600 m., 28 June 1949, *Ludlow, Sherriff & Hicks* 16666. Me La-Cho La valley, 3,750 m.; on ledges of cliff; flowers white; 1 July 1949, *Ludlow, Sherriff & Hicks* 20440 (holotype in Herb. Brit. Mus.).

S.E. TIBET: Phari, Tang La, Aug. 1879, *Dungboo*. Hills west of Lhasa, beyond Trisum, 4,200 m., 1 Sept. 1942, *Ludlow & Sherriff* 9046. Kongbo, Penam Chu, near Je (Pasum Lake), 4,350 m., 10 July 1947, *Ludlow, Sherriff & Elliot* 14109. Kongbo, valley above Sang, 29° 29' N., 94° 41' E., 3,150 m., 26 June 1938, *Ludlow, Sherriff & Taylor* 5001. Kongbo, valley above Tripe, west of Namcha Barwa, 29° 39' N., 94° 41' E., 3,600 m., 25 July 1938, *Ludlow, Sherriff & Taylor* 5393.

PLATE 13

A. *Saxifraga rubriflora* H. Sm.

B. *Saxifraga excellens* H. Sm.



B. Holotype of *Saxifraga excellens* H. Sm.



*Saxifraga rubriflora* H. Sm.

A. Holotype of *Saxifraga rubriflora* H. Sm.

PLATE 14

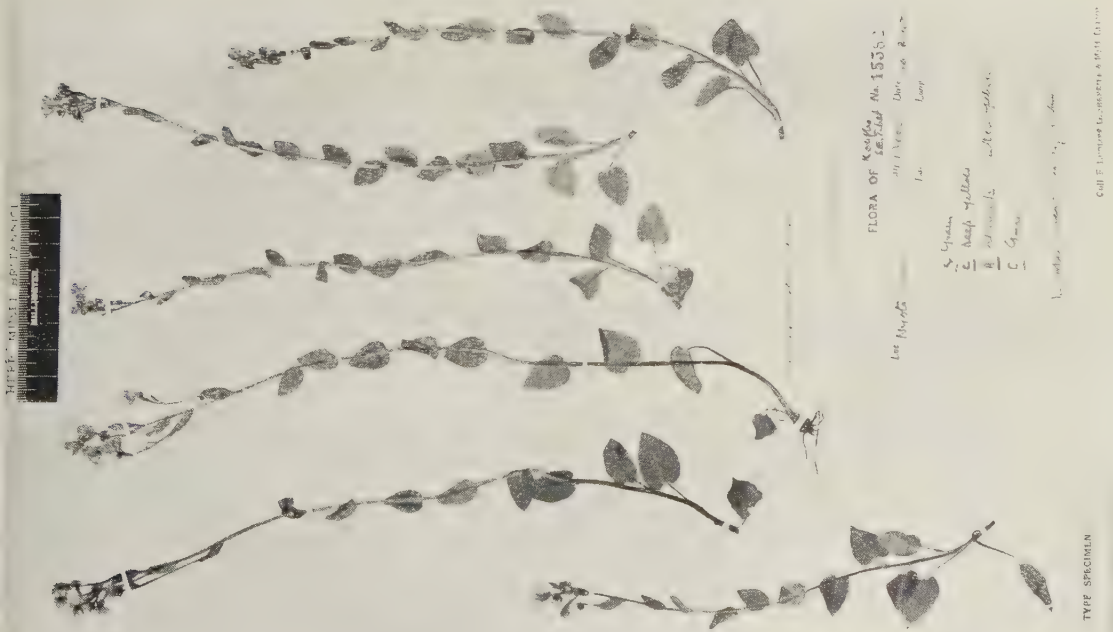
A. *Saxifraga implicans* H. Sm.

B. *Saxifraga tigrina* H. Sm.





B. Holotype of *Saxifraga tigrina* H. Sm.



A. Holotype of *Saxifraga implicans* H. Sm.

PLATE 15

A. *Saxifraga calopetala* H. Sm.

B. *Saxifraga sphaeradena* H. Sm. subsp. *sphaeradena*



A. Holotype of *Saxifraga calopetala* H. Sm.

B. Holotype of *Saxifraga sphaeradena* H. Sm. subsp. *sphaeradena*



PLATE 16

A. *Saxifraga nandoensis* H. Sm.

B. *Saxifraga montanella* H. Sm.



A. Holotype of *Saxifraga namdoensis* H. Sm.



B. Holotype of *Saxifraga montanella* H. Sm.

PLATE 17

A. *Saxifraga lepida* H. Sm.

B. *Saxifraga lepidostolonosa* H. Sm.





B. Holotype of *Saxifraga lepidostolonosa* H. Sm.



A. Holotype of *Saxifraga lepida* H. Sm.

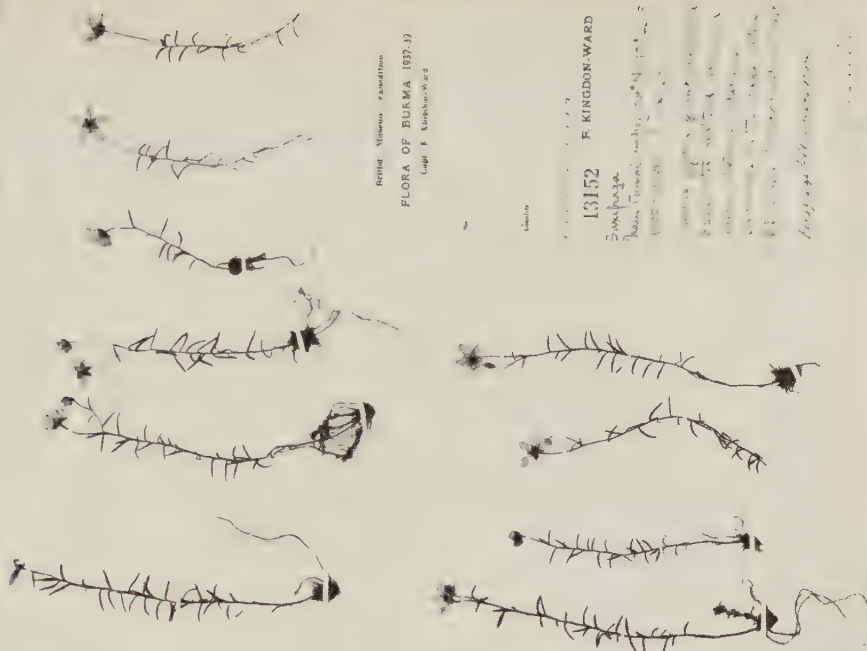
PLATE 18

A. *Saxifraga glabricaulis* H. Sm.

B. *Saxifraga heteroclada* H. Sm. var. *heteroclada*



TYPE SPECIMEN



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Saxifraga

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1937-38

1937-38

1937-38

1937-38

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1937-38



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MILLIMETER.

A. Holotype of *Saxifraga glabricaulis* H. Sm.

B. Holotype of *Saxifraga heteroclada* H. Sm. var. *heteroclada*



PLATE 19

A. *Saxifraga taylorii* H. Sm.

B. *Saxifraga isophylla* H. Sm.

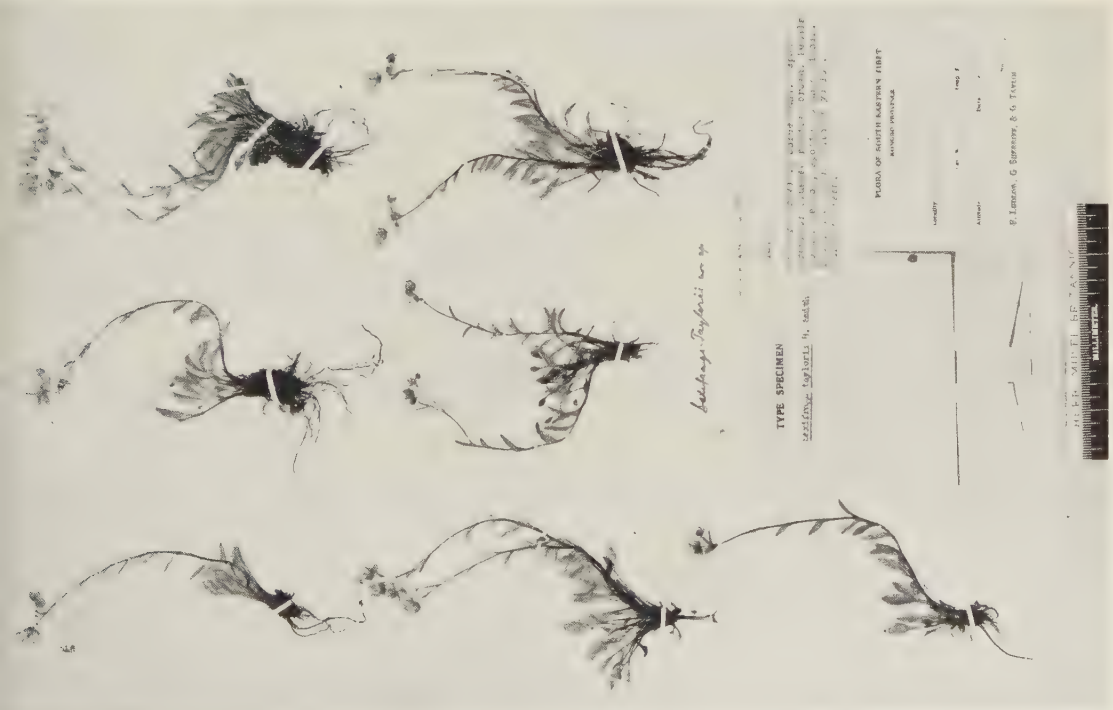


PLATE 20

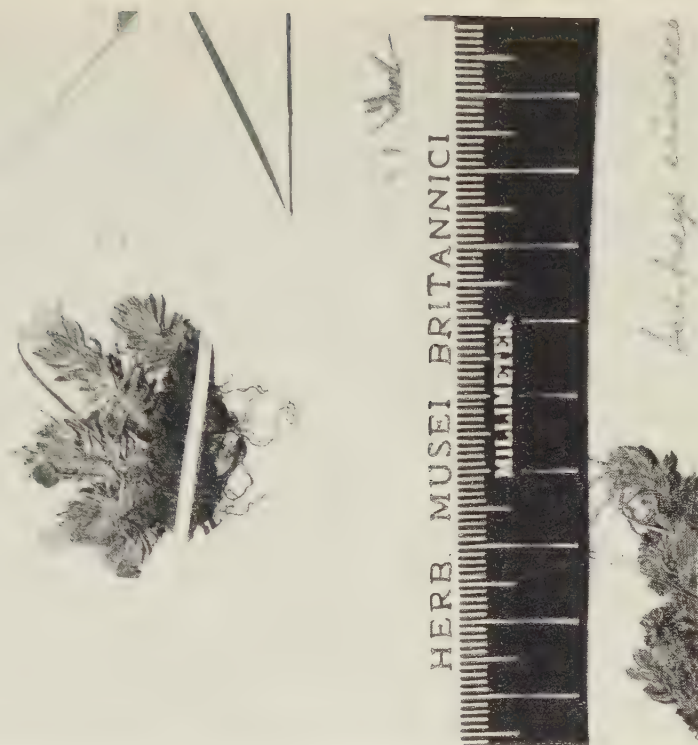
A. *Saxifraga gouldii* var. *eglandulosa* H. Sm.

B. *Saxifraga erinacea* H. Sm.





A. Holotype of *Saxifraga gouldii* var. *eglanulosa* H. Sm.



B. Holotype of *Saxifraga erinacea* H. Sm.

PLATE 21

A. *Saxifraga serrula* H. Sm.

B. *Saxifraga granulifera* H. Sm.



A. Holotype of *Saxifraga serrula* H. Sm.



B. Holotype of *Saxifraga granulifera* H. Sm,









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